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VOLUME XXX JULY-AUGUST, 1956 NUMBER 4

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THE JOHNS HOPKINS PRESS
BALTIMORE 18, MARYLAND

BULLETIN OF THE HISTORY OF MEDICINE

ORGAN OF
THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE
AND OF
THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

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Contributors of articles will receive 25 reprints without covers free of cost. An order form for additional reprints, giving the cost, is sent with the galley proof.

The Bulletin is published bimonthly. One volume of at least 500 pages is published during the year. The subscription rate is $6.00 a year in the United States and countries of the Pan-American Union, $6.25 in Canada, and $6.50 in other foreign countries. Single numbers when available are $1.50 each. Prices for back volumes may be had on application. Volume I is out of print. New subscriptions are entered to begin with the first issue of the current volume.

Active and Non-resident Members of the American Association of the History of Medicine receive the Bulletin on payment of $6.00 annual dues, of which $5.00 is for a year's subscription. Constituent Societies pay $10.00 annual dues, of which $6.00 is for a year's subscription to the Bulletin.

Claims for replacement of missing numbers must be received within 3 months (6 months in the case of foreign subscribers) following publication of the number.

THE JOHNS HOPKINS PRESS

BALTIMORE 18, MARYLAND, U. S. A.

PUBLISHED BIMONTHLY

January-February, March-April, May-June, July-August, September-October, November-December

Made in United States of America

Entered as second-class matter January 3, 1935, at the post office at Baltimore, Maryland, under the Act of March 3, 1879.

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SIGNIFICANCE OF OSTEITIS IN ANCIENT PERUVIAN TREPHINING

T. D. STEWART

Introduction

In any collection of prehistoric trephined skulls from Peru a clear distinction can usually be made between those with evidence of bone healing and those without; in other words, between individuals who survived the operation and those who died immediately or within a few days. In the latter cases brief survival is indicated, not so much by healing of the edges of the cut bone, as by porosity of the surface of the bone surrounding these cuts. On first thought, this evidence of bone reaction to damage, which I will refer to hereafter as osteitis,[1] seems like a minor and unimportant detail complicating the picture of one of man's most courageous humanitarian efforts. And as a matter of fact, most students of prehistoric trephining, depending on their medical knowledge and thought fixations, have been content simply to explain the presence of such osteitis in one of three ways: 1) as postoperative in origin, and hence probably a cause of death; 2) as preoperative and traumatic in origin, and hence as having provided the indication for operation; and 3) as postmortem

[1] Osteitis is usually septic, but may be due to other irritants. I am not sure that it is always possible to distinguish the bone changes due to these different causes.

in origin (i. e., caused by the agents of decay following death), and hence as something to be ignored. That osteitis in this particular setting can reveal additional surgical detail does not seem to have occurred to those who have provided the descriptions of trephined skulls.

Historical Review

By way of documenting the foregoing brief statement of the situation, attention is called to a recent detailed study of 250 trephined skulls—probably the largest number in any one study—by three professors of the Faculty of Medicine of Lima, Peru (Graña et al. 1954). In general, these authors concentrate on the sound motivations for trephining, the good anatomical knowledge, and the skillful surgical techniques exhibited by their early native Indians. Largely because these authors concentrate on such phases they have little to say about osteitis. In discussing the motivations for trephining, they devote only two and a half pages to "craniectomies for infections," citing only 17 cases, of which, in their opinion, at least 3 indicate preoperative infection and 5 postoperative infection. With this exception, nowhere in this 340-page publication is osteitis described in detail or given fuller interpretation.

This example from the current literature is by no means unique in its emphasis (Cf. Quevedo, 1944; Weiss, 1949) and my comment thereon perhaps will not surprise many readers. However, the scant attention paid at present to the osteitis seen in some of the ancient cases of trephining stands in contrast to the interest in this subject displayed nearly 90 years ago in connection with the first case reported from America. Sometime between 1863 and 1865 E. G. Squier, the American diplomat anthropologist, visited Cuzco, Peru, and acquired from a private collection a portion of a skull which had an artificial opening in the frontal bone (fig. 1). He sent the specimen to Paul Broca, the famous French anthropologist, who described it before the new Anthropological Society of Paris as the first certain case of primitive trephining from the New World. The pertinent part of Broca's report follows:[2]

> Il s'agit maintenant de démontrer que la trépanation a été pratiquée pendant la vie.
>
> Sur la partie latérale de l'écaille du frontal, existe une large tache blanche, assez régulière, presque ronde, mais pourtant légèrement elliptique, large de 42 millimètres, longue de 47. Les contours de cette tache ne sont nullement sinueux. Sa surface est parfaitement lisse, et présente l'aspect d'un os tout à fait normal.

[2] Broca (1824-1880), was medically trained.

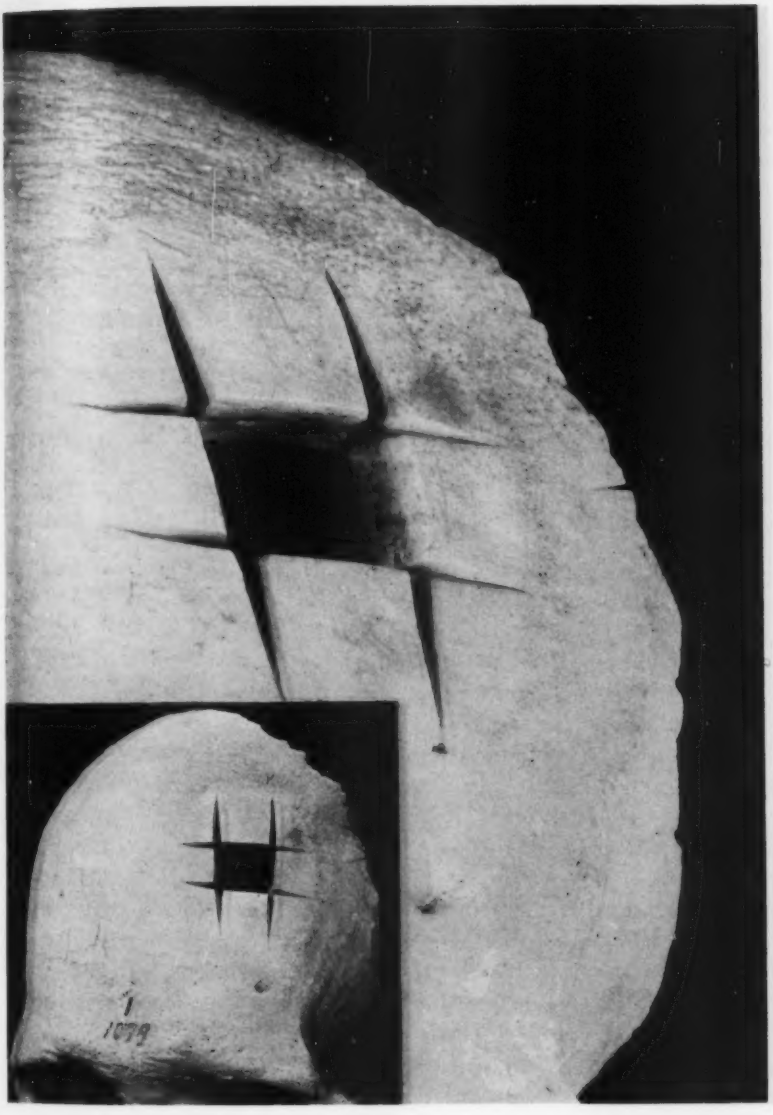

Fig. 1.

The trephine opening in frontal bone of specimen acquired by E. G. Squier in Cuzco, Peru, and described by Paul Broca in 1867. Note that the cuts are encircled by porous bone. Broca attributed the porosity to osteitis and on this basis estimated a survival of at least 7 days following the operation. This specimen is historically important because it was the first case of prehistoric trephining to be recognized. (Photographs courtesy of the American Museum of Natural History, New York.)

Autour d'elle, aux contours, la coloration générale de l'os est notablement plus foncée; elle est criblée en outre d'un grand nombre de petits trous dus à la dilatation des canalicules osseux. Le passage de la surface lisse à la surface criblée de trous est brusque; et il est tout à fait certain que la surface lisse a été dénudée de son périoste plusieurs jours avant la mort. C'est ainsi, en effet, que se comportent les dénudations de crâne. Dans les points dénudés, la couche superficielle de la table externe, privée de vaisseaux, et par là même privée de vie, ne subit aucun changement, et conserve sa structure normale, tandis que les parties environnantes, subissant les effets de l'inflammation traumatique, deviennent la siège des lésions de l'ostéite.

D'après le dévelopement des porosités de la table externe de la surface dénudée, il me semble impossible d'admettre que le sujet ait survécu moins de sept à huit jours à la dénudation. M. Nélaton, qui a examiné la pièce attentivement, pense qu'il a pu survivre quinze jours.

La trépanation a été pratiquée au centre de la partie dénudée; mais les quatre incisions qui circonscrivent la pièce enlevée s'étendent par les deux extrémités jusqu'aux limites mêmes de la dénudation. Il est dès lors bien certain que le décollement du périoste a été produit par le chirurgien qui a fait la trépanation, car la dénudation, plus régulière d'ailleurs qu'elle ne le serait si elle était le résultat d'un accident présente exactement, ni plus ni moins, les dimensions et la forme nécessitées par l'opération qui a été pratiquée sur l'os. (Broca, 1867, pp. 404-5.)

Broca does not speculate on the circumstances in this case which determined the size of the smooth area, or, according to his explanation of the smoothness, as to why the periosteum was stripped off only so far and no farther. Also, since the surrounding pitted area seems to have no distinct outer limits, he does not explain why, if the texture change is due to osteitis, the irritation spread so far and so fast under intact periosteum. Perhaps Broca did not feel justified in reading so much into this first case. We will return to this matter after we have examined other cases.

At this point it is desirable to fill in the record of opinion as to the relationship between trephining and osteitis in ancient Peru during the period following Broca's pronouncement. The first extensive description of American trephined skulls is that by Muñiz and McGee (1897). Of these collaborators Muñiz was simply the collector of the specimens and McGee—a self-trained anthropologist—was the writer. Lacking a medical training, McGee failed to appreciate the evidence of bone infection.[3] Thus, for example, he says of his case 5 (fig. 2), which exhibits cuts somewhat like those in the case described by Broca and certainly shows

[3] That McGee (1853-1912) had considerable interest in medicine, nevertheless, is shown by the fact that at the end of his life he recorded in detail the development of the cancer which took his life (McGee, 1912).

Fig. 2.

Skull with angular trephine opening described by McGee in 1897. Note the angular line of porosity surrounding most of the opening and cuts; also the discoloration within the area delimited by the line of porosity. McGee attributed the porosity to postmortem changes rather than to osteitis (USNM no. 178,473, Huarochirí.)

signs of osteitis: "There is no unmistakable trace of lesion other than the slashes of the rude instrument with which the operation was performed, *unless it be an irregular scar or sinuous scratch, about 1 mm broad and half as deep, skirting the right supraorbital ridge to the median line, and thence wandering upward and toward the left to a point 30 mm above the center of the left orbit*, which on the whole seems to be postmortem" (p. 31 italics supplied). Although McGee thus did not see all of the pathological significance in his material, he arrived at some conclusions about the motivations for the operations which have been the subject of controversy ever since. In his own words:

> . . . trephining began in early prehistoric times, and was performed after death for the purpose of obtaining amulets. It seems necessary to conclude that the operation was gradually extended to living captives for the same vicarious purpose, and it seems certain that the operation was extended in turn to others than captives for slightly modified yet still essentially vicarious purposes. On this part of the development of trephining the Peruvian specimens do not seem to bear directly.
>
> . . . there is an important stage in the development of medical and surgical practice in which the motive is wholly thaumaturgic, yet in which the incantation is accompanied by medication or manipulation; . . . Sometimes the manipulation is beneficial, when the prestige of the shaman grows, and the aimless operation is thereby encouraged until, if frequently successful, it grows into empiricism, the forerunner of scientific medicine. There is thus a gradual transition from purely thaumaturgic manipulation into empiric surgery. Now, it would appear that the Peruvian trephining represents some stage in this transition; and nothing more than inspection of the ill-planned, clumsy, and extravagant cutting is required to show that the stage was early, and that the empiricism in which the pupil imitates the teacher and the son the sire could hardly have been reached (p. 72).

McGee's poor opinion of the Indian surgeons seems eventually (1913) to have led Julio Tello, a Peruvian Indian with medical and anthropological training, to assemble a new collection of trephined skulls and present a counter argument.[4] As Tello states the case:

[4] Tello (1880-1947) got his medical training at the Universidad Nacional Mayor de San Marcos in Lima. His doctor's thesis on the antiquity of syphilis in Peru was accepted by acclamation in 1908. According to Lothrop (1948, p. 51), "Tello's attention was first directed towards the ancient inhabitants of Peru when he was only 7 or 8 years old. At that time an older brother had been commissioned to collect skulls for Dr. Manuel A. Muñiz. Years later at San Marcos his interest was aroused by Muñiz and McGee's study of trephining, the text of which he then was unable to read. Consequently at Harvard [where he continued his schooling] he took up the study of anthropology rather than medicine . . . in due time he received the degree of Master of Arts [from Harvard]. . . .

"As a result of this success Tello obtained another fellowship which took him to

In Dr. McGee's work on the Muñiz collection the question of the motives which led the ancient Peruvians to practise trephining was left, in my opinion, quite undecided on the point whether it was due to religious or thaumaturgic reasons as Dr. McGee thought, or whether it was essentially therapeutic.

Examination of the majority of the trephined skulls in our collection shows that four fundamental motives led the operator to adopt therapeutic measures:

1. An antecedent fracture.
2. A simple traumatism of the cranium which denuded the periosteum and was followed, or not, by an inflammatory process.
3. A circumscribed periostitis or osteoperiostitis, perhaps also of traumatic origin.
4. Lesions—probably of a syphilitic nature (p. 76).

In other words, Tello believed that all cases of trephining can be accounted for on therapeutic grounds and therefore it is unnecessary to draw upon thaumaturgy as the main motivation. Tello gave the position of the Indians further support by defending indirectly the surgical techniques which they employed. He was one of the first to point out that "What is undoubtedly most surprising in the study of the trephinings which the ancient Yauyos carried out is the frequency of successful results obtained in the practice of such operations" (p. 83).

Subsequent Peruvian investigators have largely followed Tello's example as the work of Graña et al., already referred to, bears witness. Also, as we have seen, the more recent writers have accepted the motivations for trephining established by Tello without appreciating, as he did, some of the significance of the occasionally associated inflammatory processes. Tello's argument in favor of his second fundamental motive—traumatism of the cranium which denuded the periosteum—shows that he had studied Broca's report on Squier's Peruvian skull and interpreted the evidence differently. This is shown in the following quotation where he is speaking about several specimens which in his opinion had been trephined under the same motivation:

In my opinion the lesions which are observed in these cases are those which proceed from a denudation of the periosteum and from the subsequent infectious phlegmatic phenomena which preceded the operation and were undoubtedly the reason for it. If the contrary is assumed it is not easy to explain the following facts:—Why was the operation in many cases left uncompleted? Why is the operation in other cases not in harmony with the lesion, because it very frequently

---

Europe in 1912. He visited England, France and Germany and attended the Congress of Americanists in London."

The paper on trephining given at the Congress in London is the fourth publication listed by Lothrop in Tello's bibliography.

presents itself eccentrically to the denudation in its borders or even outside, and why in small circumscribed operations was there the extensive denudation of the periosteum, which it is necessary to assume in order to explain the cases in which a discoloured zone appears, bordered by exfoliated osteitis embracing almost a third of the dome? All this would be explained if we consider that the lesion preceded the operation, and that it was the lesion itself which caused a sufficiently intense traumatism to denude the periosteum and subsequently to become the site of common suppurative processes. Should this be so, in the cases in which a discoloured zone appears around a recent trephining, as, among other typical examples, in the Inca skull of Squier (which led Broca to imagine that the patient had survived the operation seven days, and Nott and Nelaton to suppose the interval fifteen days), the said zone may have been due to the traumatism which led to the operation, and not subsequent to it (pp. 78-79).

Although I have not searched the literature exhaustively, I am reasonably certain that other influential writers with access to large collections of skulls (particularly Hrdlička, 1939; MacCurdy, 1923; Moodie, 1923) have not contributed anything substantial to the subject under discussion. MacCurdy describes cases of postoperative infection without going into detail, but Hrdlička states that "With rare exceptions, the operation among the Indians, everywhere, was followed by normal healing, without the bones showing any signs of inflammation or suppuration" (p. 175). Furthermore, I know from conversations with Hrdlička, that he looked upon the depressed and roughened areas sometimes associated with healed trephine openings as indications of bone scraping.[5] Although he never convincingly explained the need for scraping the bone around the opening, I feel certain that he never associated the roughening with osteitis.

The opinions as developed in this historical review may now be summarized. At the very beginning of the story Broca decided on the basis of one specimen that a zone of osteitis around an area of normal-looking bone containing an unhealed trephine opening indicated a short period of survival following the surgical procedure; and that the normal appearance of the bone in the central area was the result of removal of the periosteum by the primitive surgeon at the time of operation. Tello, on the other hand, after studying many specimens maintained that the denudation of the periosteum occurred first, as the result of trauma, followed by osteitis at the periphery, and all this provided the indication for surgery. Tello, along with McGee, also contributed heavily to the classification of various aspects of trephining and largely as a result most subsequent students of

[5] Cf. also the legend to Moodie's plate CVIIb.

this subject have become interested mainly in classification and have largely disregarded the signs of osteitis or treated them as something incidental.

To the small extent that osteitis has figured in the literature on prehistoric trephining, it is mainly in the form of a discussion as to which came first, the osteitis or the surgery. No convincing proof for the priority of either has been presented. Indeed, so little attention has been paid to the osteitis connected with trephining that the literature contains nothing definite, so far as I can discover, regarding another detail which would have helped to limit the osteitis, namely the surgical wound in the scalp. Thus Graña et al. (1954), with all their rich collections to draw from, simply speculate about the scalp incisions as follows:

> Las incisiones de las partes blandas tuvieron, sin duda, diferentes formas. Probablemente, nunca fueron simples cortes longitudinales, pues la sola separación de los bordes no podía ofrecer campo suficiente para las maniobras de trepanación. En la mayoría de las veces debieron adoptar líneas curvas, como lo hemos comprobado experimentalmente al realizar las trepanaciones en cadáveres con los instrumentos originales, dando lugar a colgajos amplios en las craniectomías extensas; y se han señalado, igualmente, largas incisiones rectilíneas con cortes verticales en los extremos, para producir dos grandes colgajos rectangulares (p. 124).

Problems and Material

On the basis of this historical review certain questions may be asked: How often do signs of osteitis appear in the area surrounding trephine openings? Is it possible to find skulls showing various stages in the development of osteitis? Is there evidence on the nature of the opening made in the scalp preceding trephining? Which came first, the osteitis or the surgery?

In seeking answers to these questions I have examined the collection of trephined skulls in the U. S. National Museum, which has the geographical and typological distribution shown in table 1. That there are marked regional differences in the types of trephining and their frequencies of occurrence has been pointed out recently by Weiss (1953). Accordingly, the information obtainable from any one collection will depend on the chance factors that led to its assembly. So far as the National Museum's total collection of Peruvian skulls is concerned, there appears to be good representation from the North and Central Coasts, nothing from the North Highlands, fair representation from the Central Highlands, and poor representation from the South Coast and South Highlands. Considering the data in table 1 on this basis, trephining appears to

TABLE 1

Distribution of trephined skulls in U. S. National Museum by locality and type of opening

Locality in Peru		Angular opening made by straight cuts	Circular opening made by cutting or scraping	Opening made by drilling a series of small holes	Area of vault scraped down to or through inner table	Method of trephining obscured by healing
Central Coast						
Ancon		..	..	1	..	..
Pachacamac		..	1 [1]	..	..	..
Central Highlands						
Chulec-Oroyo		..	2	..	..	..
Cinco Cerros		18 [2]	3 [3]	..	..	12
Huarochuri		8	5 [4]	1	..	1
Lupo		..	1	..	1	..
Matucana		..	..	..	..	1
San Damian		4	1	..	..	3
Tarma		1 [5]	..	..	..	..
Tarmatambo		..	1	..	..	2
Southern Coast						
Cañete		1	..	..	..	..
Chilca		..	..	..	..	1
Lomas		..	1 [3]	..	..	..
Southern Highlands						
Cuzco		..	2 [6]	..	1	1
Unknown		..	1	..	..	..
TOTALS	75:	32	18	2	2	21

[1] Opening shows advanced stage of healing.
[2] One skull (no. 293,778) has two openings: One is surrounded by traces of osteitis, the other is completely healed. Another skull (no. 293,793) has cuts associated with a comminuted fracture and also a healed opening.
[3] One skull has two openings: One that is unhealed and another that is completely healed.
[4] One skull has an opening in an advanced stage of healing.
[5] An unhealed cut along side of a healed circular opening.
[6] One skull has an unhealed opening along side of a healed circular opening.

be absent or extremely rare in the North Coast, scarce in the Central Coast, and fairly common in the Central Highlands. From other sources (MacCurdy, 1923; Quevedo, 1944) we know that the practice was fairly common also in the Southern Highlands, and (Tello, 1928) that it had a localized center at Paracas on the South Coast. According to Weiss (1953), the angular type of trephine opening was favored in the Central areas, whereas the circular type was favored in the South; the type characterized by scraping away an area of the skull surface is uncommon except at Paracas; and finally, the rare type characterized by a series of drilled holes is known mainly from the Central areas.

In addition to geographical distribution, table 1 shows the characteristics of the surgical openings in the bone. The cases listed in the last column, together with seven cited in the footnotes, altogether 28 or a little over one-third of the total series, have openings which had reached an advanced or complete stage of healing. Whatever osteitis may have been present in these cases would be represented by scars. On the other hand, the first four columns of table 1 list 54 cases in which the openings show little, if any, healing. Gross evidence of bone healing, under the circumstances of Peruvian trephining, probably did not put in an appearance for some days after the operation. It was during this interval that osteitis would become evident. From this accounting, wherein the figures for healed and unhealed openings total 82, whereas there are only 75 skulls involved, it is obvious that seven skulls of the series have combinations of unhealed and healed openings.[6]

Osteitis is present in 11 or nearly one-fifth of the 54 cases in which there is little or no healing of the trephine opening. These are listed and briefly characterized in table 2. It is noteworthy that all these examples of osteitis are from the Central Highlands, and that in 8 of the 11 an angular pattern of osteitis surrounds an angular opening. Put in another way, of the 31 cases from the Central Highlands with unhealed angular openings made by straight cuts, one-fourth have angular patterns of osteitis. In only three of the 15 cases from this area, in which trephining was done in other ways, is osteitis present, and in two of these the area of osteitis is angular.

Particular attention is called to case no. 293,778 in table 2 in which

[6] Still other cases of multiple openings, i. e., two healed or two unhealed, are not designated in table 1, since this aspect of the subject has little bearing on the problem under investigation. It may be noted, however, that there are records of cases (Graña et al., 1954; Quevedo, 1944; Weiss, 1949) in which an individual had four or five such operations.

there are two openings, one fresh-looking and surrounded by signs of osteitis (in an angular pattern), and the other completely healed, but surrounded by an angular area of scarring. This finding suggests that the scarring defines an area that had had the outer table exfoliated by osteitis and subsequently healed over. This idea is supported by the finding of

TABLE 2

List of specimens with angular patterns of osteitis around unhealed trephine openings

USNM no.	Locality	Description
178,470	Huarochirí	Angular line of porosity surrounding small rectangular opening.
178,473	"	See fig. 2. Angular line of porosity can be followed almost all the way around multilateral opening.
293,642	"	Angular line of porosity partly surrounds drilled opening.
293,777	Cinco Cerros	See fig. 3 and 4. Angular line of porosity around each of two rectangular openings. Area of new bone deposit (periostitis) below larger opening and under nuchal muscles.
293,778	" "	See footnote 2, table 1. Line of porosity is angular. There is an angular area of scarring around healed opening.
293,782	" "	See fig. 3. Surface around single cut is markedly exfoliated to an angular margin. A sequestrum is present.
293,786	" "	Faint angular line of porosity surrounding cuts associated with comminuted fracture. Enclosed area is discolored.
293,787	" "	See fig. 3. Surface around multilateral opening markedly exfoliated to an angular margin. Area of new bone deposit (periostitis) nearby under nuchal muscles.
294,003	" "	Surface around circular (?) opening markedly exfoliated to an angular margin. Part of area and opening lost postmortem.
294,018	San Damian	Large angular area of surface exfoliation surrounding single cut. Part of area, and possibly other cuts, lost postmortem.
379,140	Chulec-Oroyo	Beginning porosity covering an oval area around two circular openings (one probably had begun to heal before the other was made).

numerous other such healed cases in the collection (mostly included in the last column of table 1).

Table 3 lists healed cases most obviously in this category. Here again, with the exception of one case from the neighboring part of the Southern Coast (294,008, Chilca), all of the listed specimens (nearly half of the 28 healed cases) are from the Central Highlands. Seemingly, the geographical concentration of specimens listed in table 3 again reflects the prevalence

in this area of the angular type of trephine opening, since the selection is based on angularity of scarring pattern which, like the pattern of active osteitis, appears to be related to the shape of opening.

Angularity of pattern is emphasized because osteitis of a septic nature should spread irregularly unless limited by anatomical barriers. Over

TABLE 3

List of specimens with angular scarred areas around healed trephine openings

USNM no.	Locality	Maximum length of opening (mm)	Corresponding dimension of scar (mm)[1]	
293,311	San Damian	41 (rounded)	73	
293,378	" "	5 (irregular)	73	
293,384	" "	8 (irregular)	53	
293,778	Cinco Cerros	(Not available for measurement)		
293,790	" "	20 (irregular)	80	(See fig. 5)
293,792	" "	20[2] (irregular)[2]	77	
293,793	" "	39 (irregular)	63	(See fig. 5)
293,794	" "	34 (rounded)	75	(See fig. 5)
293,796	" "	32 (irregular)[3]	112	
293,797	" "	70 (irregular)[4]	100	
293,814	" "	38 (rounded)	77	
294,008	Chilca	35 (irregular)	55	
379,146	Chulec-Oroyo	16 (irregular)	78	

[1] Measured as nearly as possible in same direction as opening.
[2] Three openings within scarred area; largest measured.
[3] Two openings within scarred area; largest measured.
[4] Three openings with overlapping scars; largest measured.

the skull vault where the trephine openings are located the only natural anatomical barriers against sepsis are muscle attachments and periosteal attachments at suture lines. If the osteitis connected with trephining crossed these natural barriers and yet developed well-defined angular patterns, another type of barrier must be considered and also a causative agent other than sepsis. If we think of the osteitis as being chemical in nature—i. e., being caused by irritating dressings applied to the naked bone—the edges of the surgical opening in the scalp would constitute a barrier against further spread. I am advancing the opinion, therefore, that the ancient Peruvian surgeons often removed completely a large angular piece of scalp preparatory to trephining the skull.

Description of Selected Specimens

In further support of the thesis that the pattern of osteitis identifies the opening in the scalp, I shall describe in detail 6 cases, 3 each from

tables 2 and 3. Those from table 2 seem to represent a graded series of active osteitis, running from early involvement to an advanced stage in which there is extensive bone destruction. The next stages—i. e., recovery followed by beginning healing—are missing from the series, as might be expected, since death probably seldom occurred at this time. But recovery did take place, as is evident from the 3 healed cases from table 3 which will be described. Admittedly these cases are among the best for the present purpose, but others could be used nearly as well.

USNM no. 293,777. (*fig. 3, upper left and upper right*). This skull appears to be male and to have slight frontal deformity resulting in a very low forehead. Although the sutures of the vault are far advanced in closure, the molar teeth show only moderate attrition, suggesting middle rather than advanced age.

There are two unhealed trephine openings, each made by two pairs of parallel cuts. The larger of the two openings (outer dimensions: 34 mm square) is centered over the right lamboid suture in its middle half; the smaller opening (30 x 16 mm) is centered slightly to the right of the midpoint of the sagittal suture. The long axis of this rectangular opening runs left anteriorly to right posteriorly.

Surrounding each opening is a distinct 4- or 5-sided area delimited by a line of porous bone. The size of the outlined area is roughly proportional to that of the respective opening (73 x 62 mm; 44 x 41 mm). Although we are particularly interested in the porosity apparent to the eye externally, X-rays (fig. 4) scarcely show it; but on the other hand, they reveal an internal line of porosity closely encircling each opening. The inner circle of porosity probably is accounted for by the separation of the dura from around the edge of the opening in the skull brought about through the process of removing the loose bone, and the subsequent penetration of irritants, whatever they were.

It is noteworthy also that although the inferior border of the area of porosity surrounding the larger opening seems to be several mm above the superior nuchal line, yet there is a line of porosity leading downward and by this route irritation certainly spread into the muscle attachments below this line, for here a small patch of new bone (periostitis) appears on the surface. The irritant which produced this extension probably was septic.

USNM 293,787 (*fig. 3, middle right*). The second skull may also be male, but it appears to be undeformed. In this case the sagittal suture is almost completely closed externally and internally. All the other sutures

Fig. 3.

Views of three Peruvian skulls showing unhealed trephine openings and cuts surrounded by regular-sided areas of osteitis. Successive stages of osteitis are represented from top to bottom. In the bottom specimen a sequestrum has formed which includes the single cut through the bone. Note that the straight sides of the areas of osteitis are independent of natural anatomical barriers to infection, such as suture lines and muscle attachments. Upper left and upper right, USNM no. 293,777; middle right, USNM no. 293,787; lower left, USNM no. 293,782.

are open externally, but internally only the coronal is beginning to close. This stage of suture closure, taken with slight tooth wear, probably indicates a young adult.

A single unhealed, irregularly-shaped trephine opening (maximum dimensions: 46 x 40 mm) is located in the upper part of the occipital bone just below and to the left of lambda. One of the transverse cuts at the upper end is actually across the lambdoid suture and is in the left parietal. The lower-most transverse cut is very near the edge of the left superior nuchal line. Spreading out to the right of, and above, the artificial opening is a 4-sided area of porosity wider above than below (maximum dimensions: 82 x 80 mm). Over this area, which includes parts of both parietals, much of the outer table of bone has been undermined and lost. Internally there are signs of porosity just at the edges of the cuts. The stage of osteitis represented here would seem to be more advanced than in the preceding case.

Noteworthy again is a patch of new bone (periostitis) below the left superior nuchal line and just crossing the midline at inion. This extension, at least, could have been due to a septic process.

USNM no. 293,782 (*fig. 3, lower left*). In contrast to the first two skulls, the third has the characteristics of a female of advanced age; in other words, it is small and delicate, and the vault sutures are completely closed endocranially. Most of the teeth have been lost antemortem.

A surgical operation, consisting of a single unhealed transverse cut through the bone, has been performed near the left posterior border of the frontal. Although the cut is 35 mm long externally, the sides of the cut slope down to an internal opening only 8 mm long. Whether or not a rectangular trephine opening had been planned and then abandoned after this initial cut cannot now be determined, although it seems likely.

Surrounding the cut in the bone is a 4- or 5-sided area from which the outer table largely has been lost, leaving the remaining bone with a spongy appearance (maximum dimensions: 72 x 58 mm). Within this area, which extends over onto the left parietal for a distance of several millimeters, is a sequestrum containing the surgical cut. The coronal suture forms part of the posterior border of this separate piece of bone. Judging by the appearance within the skull, the inner table around the small opening became porous in much the same way as in the first case described above (fig. 4). Ultimately the porosity which developed on both surfaces combined and produced the sequestrum.

It should be apparent from this description that the osteitis has pro-

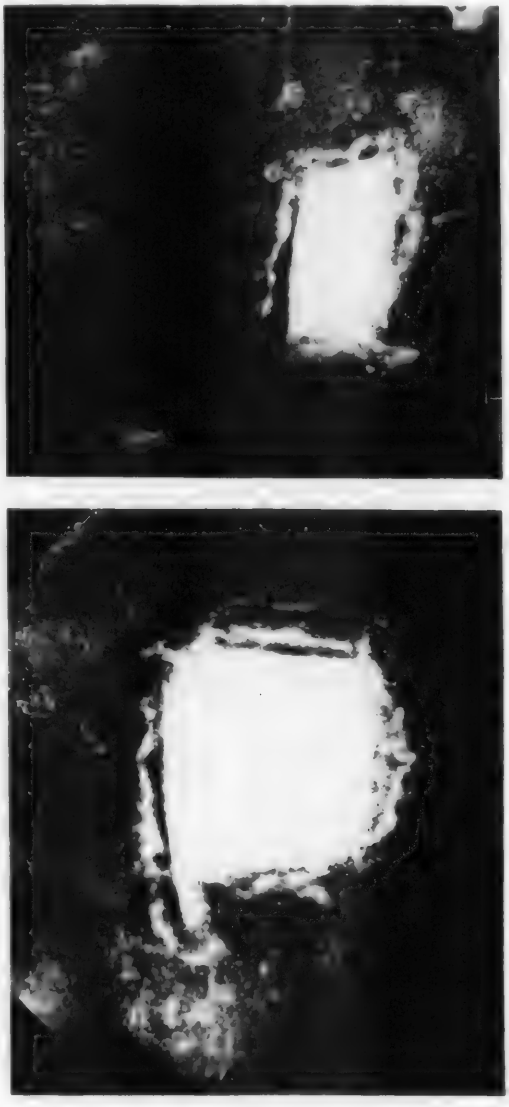

Fig. 4.

Roentgenograms of the two trephine openings in the skull shown at the top of fig. 3 (USNM no. 293,777). These pictures were made by placing the film on the inside of the skull. A line of decreased density is apparent immediately surrounding each opening. Since nothing is visible on the exterior to account for this, it is due to porosity of the inner table. The existence of the porosity can be verified also by direct inspection and by palpation. (Natural size. Orientation as in photographs of skull.)

gressed to a stage beyond that represented in the preceding case and far beyond that of the first case. Noteworthy in the present case are the sharp V-shaped borders of the area of osteitis on the left side of the frontal. Not only does one of these borders cross the coronal suture, but the angle of the V extends into the area of attachment of the temporal muscle. The only thing here that limited the osteitis was the edges of the surgical opening in the scalp.

USNM no. 293,790 (*fig. 5, upper right*). The sex of this skull is in doubt, but may well be female. The vault sutures are in an advanced stage of closure, both inside and out, and extensive antemortem destruction of the upper alveoli has occurred, all of which suggest advanced age.

Two completely healed trephine openings are present, one centering on the anterior half of the sagittal suture, and the other (not shown in illustration), much smaller, located at the top of the temporal fossa. Each opening, now ragged in outline, is surrounded by an angular area of scarring. Since for the present purpose the larger opening demonstrates the angularity of outline more plainly, further description will be restricted to it.

The illustration shows that the larger scar is nearly square (between 80 and 85 mm across) and oriented accurately with the median line. Anteriorly the scarring just crosses the coronal suture, whereas posteriorly it extends to within 5 mm of the left parietal foramen (the right foramen is missing). Here again is a case in which the process which led to scarring had crossed natural barriers and yet had been confined to a geometrically regular form. This form can be accounted for only through the assumption that the limits of the scarring represent the extent of the opening through the scalp.

USNM no. 293,794 (*fig. 5, middle left*). As in the previous case the sex is in doubt, but a male seems likely in view of the fairly well developed supraorbital ridges. Here, too, the vault sutures are in an advanced stage of closure and the upper jaw is edentulous, thus suggesting an elderly individual.

A circular trephine opening surrounded by a large 4-sided scar is located a little to the left of the midfrontal region. The maximum diameter of the opening is 34 mm; the longest side of the scar measures about 75 mm and the shortest about 56 mm. One corner of the 4-sided scar is at glabella; the opposite corner is about 18 mm to the left of the midline; another corner rests on the left temporal ridge. Within the scar the opening is eccentric, again to the left side.

Fig. 5.

Views of three Peruvian skulls showing healed trephine openings surrounded by regular areas of scarring. The specimen in the lower right in addition shows an opening caused by a fracture which had just been operated upon and which was probably the cause of death. Note that the straight sides of the scarred areas are like those of the areas of osteitis in fig. 3. These scars are believed to represent osteitis that had healed, and their straight sides the extent of the surgical openings in the scalp. Upper right, USNM no. 293,790; middle left, USNM no. 293,794; lower right, USNM no. 293,793.

By comparison with the other specimens illustrated in fig. 5 the opening here is exceptional in being rounded. Whether or not the original opening was of the same form is open to doubt, since the healing could have obliterated the signs of angular cuts. As in the other cases the limits of the scarred area are remarkably regular and do not appear to have been determined by natural anatomical structures.

USNM no. 293,793 (*fig. 5, lower right*). A large male of advanced age is certainly represented by this last skull to be described. Death probably followed an attempt to operate on a depressed fracture situated in the midline near the vertex. However, a number of years prior to his death this individual had undergone trephining and had fully recovered from it. We are concerned here with this earlier operation, because it is represented now by an irregular opening in the midst of a 4-sided scarred area. One of the new fracture lines passes through the older operative area.

The healed opening is in the frontal bone and its posterior border corresponds in location to part of the right coronal suture. The scarring extends just beyond bregma, involving parts of both parietals, but very little of the left. The longest diameter of the opening is 39 mm; the longest side of the scarred area is about 74 mm; the shortest side about 60 mm. The long axis of the scarred area runs a little diagonally, right anterior to left posterior. One side of this area passes along the edge of the attachment of the right temporal muscle. With this exception the sides of the scar do not conform to natural anatomical structures.

Discussion

The evidence presented in the foregoing sections demonstrates that in a collection of 75 trephined skulls, collected mainly in the Central Highlands of Peru, close to one-third show geometrically regular patterns of osteitis or of scarring around surgical openings in the bone. The combination in one case of an unhealed and a healed opening, the former surrounded by a geometrical pattern of osteitis and the latter by a similar pattern of scarring, suggests that here the scarring represents healed osteitis. Assuming this to be true, the osteitis, whether active or healed, presents areas of involvement which are not only regular in shape but independent of anatomical structures. To account for these features it is necessary to assume that the borders of the osteitis corresponded to the edges of the opening made in the scalp preparatory to trephining. This

means, of course, that in such cases the primitive surgeons completely removed large pieces of scalp, perhaps without realizing the possibilities of skin flaps which could be put back over the wounds and sutured.

In most cases the nature of the osteitis, whether chemical or septic, is debatable. Evidence of infection having spread beyond a surgical scalp wound was seen in only two cases. Since with these exceptions the osteitis was confined within the limits of the operative field, a good argument can be made out of its being mainly of chemical origin, and due to irritants in the surgical dressings. MacCurdy (1923, p. 246), noting indications of "infections" in connection with a trephine opening, asked, "Did the surgeons of that time possess any effective means of combatting septicemia [sic]?" His answer was:

> It would seem so; especially in view of the fact that the Incas were on occasions successful embalmers of their dead. Recently Reutter has made an analysis of embalming substances from Peru. These were found to contain *Baume de Perón*, menthol, salt, tannin, alcaloids, *saponines* and undetermined resins. Like the ancient Egyptians and Carthaginians therefore, the Incas made use of substances rich in "*acide cinnamique*" to embalm their dead. As these have excellent antiseptic properties, it is permissible to presume that the surgeons of the time have taken advantage of their therapeutic value in trephining operations.

More recently, Quevedo (1944, p. 107 ff.) has listed the following plants as used in the form of infusions for washing wounds:

Tagetes minuta L.
Flaveria bidentis (L.) Ktze.
Mutisia viciaefolia Cav.

He lists also the following plants as used in applications to contusions in the form of pulverized leaves or poultices:

Oenothera multicaulis R. & P.
Lepidophyllum quadrangulare (Meyen) B. & H.

In addition Quevedo quotes statements by Giuseppe Bazzocchi (1936) to the effect that the Indians distilled an aromatic and fluid balsam from *Myroxilon peruiferum* (L. fil.); that they extracted antiseptic substances from *Ambrosia peruviana* (Willd.); and that they applied to cutaneous lesions a dense, dark green solution obtained from deposits of bituminus schists (ichthannol).

Except for *Flaveria* and *Lepidophyllum*, all of these plants (but not always the particular species) are listed in the United States Dispensatory (Osol and Farrar, 1947). Of *Oenothera* (evening primrose), for exam-

ple, it is stated that "the stem contains considerable tannin as well as mucilage. . . . A strong decoction has been used locally in eczema and other skin diseases" (p. 1536). In general, however, little seems to be known about the pharmacological action of these plants and little information is given beyond the fact that they were more widely used in the dark days of therapeutics.

Substances such as cinnamic acid, ichthanol and Peruvian balsam (closely related to the oleoresin sometimes known as Brazilian balsam derived from *Myroxilon peruiferum* (L. fil.)), have had long usage as local stimulants, particularly in cases of indolent ulcers, but are stated to be feebly irritant.

Thus such knowledge as we possess of the pharmacological action of some of the remedies likely used in ancient Peru is based on experience with constituents obtained in pure form and used in connection with the soft tissues. It is quite another thing to estimate the reaction produced by an impure product, such as the Indians doubtless used, and especially when this was applied directly to bone which had been deprived of some of its blood supply through removal of periosteum. Under these circumstances, it seems to me that even substances low in irritant properties might speedily result in necrosis and exfoliation of the outer table of bone, as well as that part of the inner table surrounding the surgical opening from which the dural membranes had been detached.[7]

If this explanation has validity, it is necessary to account for the seeming lack of an angular pattern of scarring around trephine openings of the circular type. As has been pointed out, the collection under study is poor in examples of the circular type of opening, a type which occurs most commonly in the South of Peru; but the literature suggests that healed cases of this type generally lack extensive scarring. Unlike the angular type of opening, which required space for manipulating the surgical instruments, the circular type probably could be executed without, or with very little, more space than was actually needed for the opening in

[7] I am indebted to Dr. Melvin L. Moss for calling to my attention his experiments on rats (Moss, 1954) in which he had occasion to mistreat cranial bone in somewhat similar fashion. His account of the procedure (pp. 343-4) follows:

"The external periosteum of the neuro-cranium was scraped and the bone burnished with cotton. This was usually followed by burnishing with 95% ethyl alcohol, 2% silver nitrate, and 5% phenol, applied in various combinations. Celloidin (4%) was applied directly to the bones and the edges of the skin incision were not approximated in a majority of the animals. The 39 animals utilized ranged three to nine days of age at extirpation, and were sacrificed 17 to 27 days post-operatively. The effects of periosteal damage were evident in all cases. The external tables were rough and pitted."

the bone. This is somewhat like saying that a man needs more space for operating a saw than for operating a chisel. Perhaps such basic differences in operative technique account for the absence of extensive osteitis associated with the circular openings. Did the primitive surgeons cut circular holes in the scalp in such cases? Or did they make single incisions and retract the edges? A larger number of skulls with the circular type of opening will need to be studied before these questions can be answered.

In this connection, attention is called to Quevedo's statements (1944, pp. 95-96) about finding evidence of sutures preserved in the mummified tissues at the site of a healed circular trephine opening:

. . . en nuestras labores preliminares constatamos al examinar el cráneo, una ligera depresión en la región parietal izquierda y sobre ella pudimos apreciar una elevación lineal, en los restos de cuero cabelludo, aproximadamente de 6 centímetros de extensión y orientada en sentido antero-posterior. La impresión evidente e inconfundible fué la de tratarse de una sutura quirúrgica, cuyos bordes habían sido casi perfectamente adaptados. Por su continuidad y regularidad, pensamos que fué una mano firme y segura del acto que realizaba, la que la motivó.

Hecha esta primera observación, desprendimos los restos de cuero cabelludo, con relativa facilidad en las zonas circundantes; más a nivel de la región que habíamos considerado ya como una incisión suturada, existía una adherencia íntima del cuero cabelludo con los planos subyacentes y tuvimos que recurrir al empleo del bisturí para su desprendimiento, realizando un verdadero trabajo de disección. Grande fué nuestra sopresa, cuando concluída la liberación de aquella porción, pudimos constatar que a su nivel, el cráneo presentaba una trepanación verdadera, realizada en vivo y con signos evidentes de una larga supervivencia. Cuestiones éstas que constatamos en el estudio ulterior de dicha trepanación. Quedaba así entonces establecida una relación clara de causa a efecto, entre la trepanación encontrada y la incisión quirúrgica encontrada a su nivel. El examen de aquella línea de incisión saturada, nos demostró la existencia de pequeños agujeros u orificios transversales, unos frente de otros, situados en las proximidades de los bordes de la incisión y la presencia de pelos o cerdas que las atravesaban. Aún cuando el estudio integral de la forma, cómo estaba obturada la trepanación, el material de obturación, etc., etc., no nos ha sido posible todavía determinar, y que desde luego serán motivo de consideraciones a esclarecer, debemos indicar que, a nivel del orificio trepánico encontramos una adherencia completa entre los planos superficiales y la duramadre subyacente, existiendo una especie de disco, adaptada perfectamente a los bordes del orificio de trepanación. Ahora bien, ¿existe en este caso particular, interposición de algún elemento entre los planos del exocráneo y la duramadre? ¿Y en esto caso, se trata de una prótesis oclusiva de material que por falta de medios no hemos podido precisar? ¿Se trata simplemente de la adherencia de la duramadre a través del orificio de trepanación, con los planos anatómicos superficiales, que al haber sido perfectamente delimitada por el contorno del orificio da la impresión de un disco a este nivel? Hubiéramos deseado acompañar a este

trabajo nuestras conclusiones definitivas de observación sobre estos hechos: más la imposibilidad material de hacer cortes histológicos, nos incapacitan a resolver los problemas planteados frente a este hallazgo.

This evidence led Quevedo to conclude:

Si tal vez la experiencia les había enseñado a los antiguos Cirujanos del Incanato, de que cuándo la intervención sobre el cráneo es precoz, y completa, y cuándo no existen signos de complicación (supurativa para ellos—infecciosa para los cirujanos actuales), las heridas del cráneo debian ser suturadas.

This description tells us only that a linear elevation 6 cm long, resembling a healed sutured incision, was observed in the mummified tissues "over" a depression in the skull vault, which proved to be a healed trephine opening. The location and size of the opening are not stated, but two such cases are illustrated: 1) a very large opening in the left fronto-parieto-temporal region; 2) a small opening in the right parietal region. The second case seems to correspond to the length of the "suture line." In this place the proper direction for the incision would be anteroposterior.

Quevedo thus implies that the surgeon in this case operated on the skull through a relatively short linear incision in the scalp, spreading the opening by retractors as needed. If he has correctly interpreted the evidence—and he himself is an experienced surgeon—the Indians in the region of Cuzco, in the Southern Highlands, may have perfected their surgical technique beyond the stage existing in the Central Highlands.

For further contrast with the picture given by Quevedo, I am reproducing in fig. 6 an artist's version of a mummy in the Museo de Antropología in Lima (Magdalena Vieja). I was unable to examine this specimen closely since it was in an exhibit case, but the individual appears to have died as a result of trephining. The opening in the skull is angular; and the opening in the scalp, which exposes the bone where the trephine opening was made, also is angular. Being in Lima, this specimen probably came from Central Peru. Obviously, the method of operating as here depicted is exactly what I have been inferring from cases such as are illustrated in figs. 3 and 5.

There would have been no reason to use sutures in a case such as this. If the individual had survived postoperative infection and overcome the reactions resulting from the irritants brought in contact with the naked bone by the dressings, granulation tissue doubtless would have formed and eventually epithelization would have occurred. The new tissue covering the bone in this way probably would have fused at the trephine opening

with the exposed dura, forming an obturator like the one described by Quevedo. Nevertheless, in reaching this end result a record of what had taken place would have become registered in the bone, by reason of the damage caused by the osteitis.

Fig. 6.

Artist's drawing of a mummy in the Museo de Antropología in Lima, Peru. Note that a large angular piece of scalp has been removed and the exposed bone trephined in an angular fashion. The specimen probably comes from Central Peru; it was not examined for evidence of osteitis. (Photograph courtesy of Pedro Weiss.)

Now that the evidence has been presented and discussed, I can turn back to the Squier skull and Broca's opinion that it exhibits signs of osteitis (pp. 294-296). Comparison of this skull (fig. 1) with those shown

in fig. 3 reveals an essential difference. In the Squier skull the trephine opening is in a circular area of smooth bone and surrounding the central smooth area is bone of a more porous texture (beginning osteitis?) and of indefinite extent; whereas, in the specimens available to me, beginning osteitis is always in the form of an angular line surrounding the opening. Furthermore, in later stages of osteitis all the area within the original line of demarcation becomes porous, which is the reverse of the condition exhibited by the Squier skull. These unaccountable differences give rise to doubts regarding Broca's interpretation. Could it be that the cuts in this case, which are more regular than usual, were made postmortem to investigate the nature of the circular area of smooth bone? It matters little now, of course, whether or not Broca was mistaken in this instance. The weight of his opinion succeeded in insuring the acceptance of a remarkable prehistoric custom and later discoveries removed any doubts that may have existed. If those who afterwards described other specimens from Peru had followed more closely Broca's logic regarding the significance of osteitis, it would not have been necessary for me to write the present paper at this late date.

I am indebted to Mr. Ben Chapman of the Radiological Department of Georgetown University Hospital for his ingenuity in making the roentgenographs shown in fig. 4. Dr. William J. Tobin, Honorary Research Associate of the Smithsonian Institution, was helpful in checking some of my interpretations in the light of his surgical experience. The idea that the osteitis might be chemical, rather than septic, was first expressed by Dr. MacDonald Critchley of The National Hospital, Queen Square, London, on the occasion of his visit to my office in May, 1955.

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Addendum

After this paper was submitted for publication I received a copy of a new article by Pedro Weiss entitled "Casos peruanos prehistoricos de cauterizaciones craneanas; T sincipital de Manouvrier" (*Rev. Mus. Antrop. y Arqueol.* Lima, vol. 2, pt. 2, 1er sem. 1955, pp. 3-23 and 8 pl.). Much to my surprise I find that Dr. Weiss has described 24 skulls with trephine openings and areas of exfoliation or scarring similar to those which I have here described. However, his explanation of these features differs from mine, in that he attributes most of the bone damage to cauterization. Furthermore, he sees a basic similarity, and hence relationship, between his Peruvian specimens and the "sincipital-T" cases from the Neolithic Period in France described around the turn of the century by Manouvrier; this despite the fact that the scars in his Peruvian cases lack the characteristic T shape.

Our explanations of the geometrical shapes of the lesions necessarily also differ. Where I relate the straight sides to the edges of the surgical opening made in the scalp prior to trephining, Dr. Weiss relates them to the edges of the scar which he believes was made by application of the cautery. He even attributes many of the openings in the bone to trephining by cautery, whereas, like many others who have studied trephined

skulls, he gives little consideration to the surgical handling of the scalp. I do not cite cauterization as a possible cause of the "osteitis" I have described, because previously I showed that proof of this practice is elusive (Stewart, T. D. (1937): Did the American Indians use the cautery in bone surgery? *Am. J. Phys. Anthrop.*, vol. 23, pp. 83-88).

I still feel that the explanation which I offer in the present paper has the advantage of simplicity and naturalness. This explanation treats all cases of trephining as stages in a single surgical-pathological process, whereas Dr. Weiss' explanation treats cases of bone scarring as etiologically distinct from those of osteitis. Unfortunately, the true explanation may never be determined. However, Dr. Weiss' point that his series includes an unusually high percentage of females and children, such as is typical of series with the true "sincipital-T," requires checking against a much larger series of Peruvian specimens. Likewise, his point that the native surgeons favored bregma as the site of operation, again just as in the cases of true "sincipital-T," needs similar checking. But regardless of which explanation ultimately is favored, the fact remains that he and I, independently and almost simultaneously, have recognized some details of ancient Peruvian surgery which have long been neglected.

A LETTER FROM BARTHOLOMEW OF SALERNO TO KING LOUIS OF FRANCE

C. H. TALBOT

In 1924 Dom Quentin published two letters which he had discovered in a manuscript at the Cathedral of Puy and which concerned Peter the Venerable of Cluny and a certain Magister Bartholomaeus, a physician.[1] These letters could not be dated, but as Peter died 25 December, 1156, it is evident that the physician must have been living sometime in the first half of the twelfth century. From the letters it was clear that Bartholomaeus was not a Frenchman,[2] that he was living and practicing his art at some distance from Cluny and that he was in charge of some kind of clinic where the sick could be tended.[3] The fact that no other physician of the name could be identified except Bartholomaeus of Salerno inclined Dom Quentin to think that the celebrated master was involved, and coupling this with the undoubted Salernitan flavour of the medical advice given and a quotation in the letter from the works of Constantinus Africanus,[4] who was the teacher of Bartholomaeus, the identification seemed highly probable.

In the letter of Peter Venerable, however, a condition was laid down that the disciple, Bernard, who was to convey to Peter the physician's advice and see that it was carried out, must make the journey to Cluny and back to his starting point within a month,[5] and because this period of time seemed too short to cover the distance that lay between Burgundy and the south of Italy, Wickersheimer rejected the identification.[6] The

[1] H. Quentin, "Une correspondance médicale de Pierre le Vénérable avec Magister Bartholomaeus," *Miscellanea Francesco Ehrle*, I, Roma 1924, pp. 80-86.

[2] ". . . frustra in Gallia nostra alter quaerendus esset si a vobis . . . consilium mihi deesset" says Peter the Venerable.

[3] "totius domus meae providentiam operatorii et aegrorum commisi."

[4] ". . . et, ut evidentius dicam, idem materiam morbi desiccat et purgat, membrum vero humectat et lenit: verbi gratia, mirra, ut in libro graduum habetur, sicca est." The reference can be found in *Constantini Africani post Hippocratem et Galenum* etc. Basileae 1536, p. 359.

[5] H. Quentin, *loc. cit.*, p. 83.

[6] E. Wickersheimer, *Dictionnaire biographique des médecins en France au moyen âge*, Paris 1936, p. 57. K. Sudhoff in a review of the article by Quentin had already expressed his doubts on the point: see *Mitteilungen zur Geschichte der Medizin und der Naturwissenschaften*, vol. 24, p. 83. 1925.

discovery of another letter addressed by Bartholomaeus to King Louis of France opens up the question once more, though Dom Leclercq, persuaded by the fact that all these letters appear to centre on Burgundy, seems prepared to admit the existence of some French physician of the same name operating in the south of France.[7]

In view of the undoubted importance of Bartholomaeus as one of the leading figures at Salerno at that time [8] and the possibility that other works, hitherto unknown but bearing his name, may stem from the same source,[9] it seems worth while to attempt to settle the matter. As no external evidence is available at the moment, the only course left open is to confront the latest discovery with the text of the *Practica* and to find out by comparison whether one and the same person could have written both. There is no doubt that the general presuppositions of any medical treatise written at the time would have been common to many writers, because they are all more or less derivative, and any conclusion based on such agreement would be extremely feeble and suspect. But if a close verbal agreement can be proved, with almost identical vocabulary, then such doubts as remain should be easily dispelled.

For this purpose, then, before printing the complete text of the letter I will place in parallel columns certain passages from the *Practica* and the correspondence so that readers may judge for themselves how close the two texts are.[10]

Practica	Epistola
P. 328: Circa cibum vero et potum tria attenduntur, videlicet quantitas, et qualitas et numerus. Qualitas utrum sit calidum et frigidum, humidum et siccum, digestibilis vel indigestibilis, laxa-	Item considerandum est utrum cibus uel potus sit calidus uel frigidus uel siccus uel humidus, digestibilis uel indigestibilis, constrictiuus uel laxatiuus.

[7] J. Leclercq, "Gratien, Pierre de Troyes et la seconde croisade," *Studia Gratiana*, II, Bologna 1954, p. 588.

[8] F. Puccinnotti, *Storia della Medicina*, II, part i, Livorno 1855, pp. 360-2 and *Documenti, ibid.*, pp. lxvi-lxxix: H. Haeser, *Lehrbuch der Geschichte der Medicin und der epidemischen Krankheiten*, I (3rd ed.), Jena 1875, pp. 663-5: J. L. Pagel, *Einführung in die Geschichte der Medizin*, ed. K. Sudhoff, Berlin 1915, p. 172: M. Neuburger, *History of Medicine*, II, part i, p. 28. In contrast to these Fielding H. Garrison, *History of Medicine*, 4th ed. 1929, p. 149 gives Bartholomaeus exactly two lines, whilst Laignel-Lavastine, *Histoire générale de la médecine*, II, Paris 1936, p. 37 does not seem to have profited from anything published since the time of de Renzi: cf. P. Capparoni, *Magistri Salernitani nondum cogniti*, p. 44.

[9] Professor Kristeller has kindly made me aware of other texts which he has discovered and which he will make public in the future.

[10] S. de Renzi, *Collectio Salernitana*, IV, Napoli 1856, pp. 321-406: *Practica Magistri Bartholomaei Salernitani*.

PRACTICA

tivus vel constrictivus. Calidus frigidis est utilis, frigidus calidis. Indigestibilis calidos ventres habentes levis, et digestibilis frigidos, laxativus utilis constipatis, constrictivus laxatis. Quantitas attenditur, scilicet utrum multus cibus sit aut paucus aut mediocris. Multo cibo sunt reficiendi qui ex calore stomaci fortem habent digestionem cum tamen indigestibilis sit appetitius.

Numerus autem refectionis attenditur quia quidam bene se habent cum semel in die reficiuntur male vero cum bis vel amplius, alii vero e converso. Item naturaliter humidi brevibus somnis utantur quum desiccant vigilie, sicci vero prolixioribus quum somnus humectat. . . . Motus, id est exercitium, confert humidis et frigidis, nocet calidis et siccis nimium. Quies confert calidis et siccis, frigidis et humidis nocet.

P. 329: De accidentibus animi manifestum est, quum omnia desiccant, excepto gaudio quod humectat. Quedam calefaciunt, ut ira, unde confert melancolicis, nocet vero colericis.

P. 329: Medicinarum alia confortativa, alia laxativa, alia immutativa. Confortativa tribus modis operatur: aut calefacit aut infrigidat aut mediocritatem conservat. Medicina que calefaciendo operatur membrorum actiones ut si quis habat stomachum infrigidatum damus ei diacitonnitem calidum, diamillion. Infrigidando confortant membri substantiam. Ut si aliquis habeat substantiam epatis calefactam, damus ei epar infrigidantia, ut rosatum novellum vel triasandalis et zuccarum rosatum. . . . Ad conservationem mediocritatis damus diamargariton et diantea unaquaque earum medicinarum convalescentibus et debi-

EPISTOLA

Nam calidus utilis est frigidis, frigidus calidis, siccus humidis, humidus siccis. Digestibilis frigidos ventres habentibus, indigestibilis calidos, laxatiuus constipatis, constrictiuus laxatis. Item quantitas cibi attendenda est, scilicet ut sit cibus modo multus, modo paucus, modo mediocris. Nam multo cibo reficiendi sunt, qui ventres habent calidos, quamuis paruum habeant appetitum.

Numerus etiam refectionis attendendus est. Quidam vero bene se habent, cum semel reficiuntur in die, male uero, cum bis aut ter, aut sepius. Alii uero e contrario. . . . Illi igitur qui naturaliter sunt humidi, uti debent breui somno, uigilie namque desiccant. Prolixo sicci, prolixius enim somnus humectat. Exercitium confert humidis et frigidis. . . . Quies uera confert calidis et siccis, quia infrigidat eos et humectat. Nocet humidis et frigidis, augmentat enim frigiditatem et humiditatem eorum.

Accidentia animi dicuntur ista . . . que omnia desiccant, preter gaudium quod humectat. Quedam enim calefaciunt, ut ira, que prodest humidis et frigidis, ut sunt flegmatici et melancolici.

Medicina alia est confortatiua, alia est laxatiua. Laxatiua a futura habitudine mala preseruat, confortatiua autem tribus modis operatur, calefaciendo, infrigidando, mediocritatem conseruando. Calefaciendo, ut si quis habeat stomachum infrigidatum datur ei diacitoniten calidus, diamilon et similia: diacitoniten datur electuarium de coctanis, diamilon de maluis. Infrigidando, ut si quis habeat epar calefactum, datur ei epar infrigidantia, ut rosata nouella, rodosaccara, triasandali et cetera huiusmodi. Mediocritatem conseruando, ut diamargariton, dianteos et similia. Omnia etiam dicta medicamina utilia sunt ab

PRACTICA	EPISTOLA
lem virtutem habentibus. . . . Notandum autem quod confortativa medicina presentem conservat sanitatem, laxativa vero a futura egritudine preservativa ab habitudine mala.	egritudine conualescentibus et debilem uirtutem habentibus.
Sunt alii causam egritudinis iam in se habentes et hii neutri egrotaturi vocantur: quorum alii sunt egrotaturi sola ex qualitatis distemperantia, alii ex superfluis humoribus.	Notandum est quod egrotantium alii egrotant ex aliquo humore, alii ex sola qualitate. . . .
Qui ex sola qualitatis distemperantia egrotaturi sunt dande sunt medicine in contrariam qualitatem proportionaliter distemperate et non laxative.	Illis qui paciuntur ex sola qualitate est danda medicina laxatiua sed talis dumtaxat que sit distemperata et contraria qualitate.
Infrigidatis damus calefacientes eas ut necesse est, calefactis damus infrigidantes et sic ceteris. In habentibus vero humorem superfluum, primum attendendum est quis humor habundet; repletionem sanguinis flebotomia solvit, aliorum humorum vero medicinam laxativam damus. . . .	In his ergo qui egrotant ex humore considerandum est quis humor habundet. Et si sanguis superhabundet flebotomia est necessaria. Si alius humor, purgandus est cum laxatiua medicina que purgat illum humorem qui est in causa.

These selected passages show such striking conformity that if it is admitted that the *Practica* is the authentic work of Bartholomaeus of Salerno, there can be no doubt who is the author of the letter to the king of France. Unfortunately it is not possible to treat the letter to Peter the Venerable in the same way, for the simple reason that the writer is not giving general instructions on how to keep well, but treating a particular malady. In those passages of the *Practica* where Bartholomaeus lists the remedies for headaches, sore eyes, and catarrh [11] a simple list of ingredients for pills is given, whereas the advice given to Peter for the cure of these ailments is couched in much more general terms, the precise remedies being left to the discretion of his messenger.[12] It would, however, be most unlikely that two physicians of the same name, both living outside France and enjoying so considerable a reputation that people in exalted station sought their ministrations, would exist at the same period. We are therefore led to the conclusion that both the letters emanate from the same source.

[11] H. Quentin, *loc. cit.*, p. 86.

[12] "De balneis autem et stuphis, de suffumigationibus et fomentationibus circa pectus, de pillulis etiam sub lingua tenendis, de pillulis ad catarrum, de paulino balsamate, de gargarismis et similibus satis cum Bernardo nostro disserui," *loc. cit.*, p. 86.

Furthermore, it would be an extraordinary coincidence if two physicians of the same name and living at the same time had an assistant bearing the name of Bernard.[13] We know that Bartholomaeus of Salerno had a disciple named Bernardus Provincialis, or Bernard of Provence, who wrote a commentary on the works of Bartholomaeus between 1150 and 1160.[14] The Bernard who was the bearer of the letter to Peter the Venerable and to whom was committed the task of carrying out his master's instructions was not only a Frenchman, but was in charge of the clinic which the writer administered. Was he also the bearer of the letter to the king of France? And would the appearance of this letter in a manuscript belonging to a house in Burgundy be explained by the intervention of a Frenchman in these negotiations? The hypothesis is alluring and not wholly improbable. There is certainly no strong argument against allowing that if Bartholomaeus of Salerno gave medical advice to the king of France he should also have been called in for consultation by one of the most celebrated monastic leaders of the same period and the same country.

To which king of France, then, was the letter addressed? There are two candidates, Louis VI (1108-1137) and Louis VII (1137-1180). The former, who was known as Louis le Gros on account of his excessive *embonpoint*, was nevertheless a man of such surprising energy and agility that he was also surnamed "l'Eveillé," "the wide-awake." His health was the complete antithesis of his father's, Philippe I, who was described as being "moult affaibli," so that it is much to be doubted whether he had any preoccupations about his health or gave much attention to diet and baths such as Bartholomaeus prescribes.[15] His son, Louis VII, is a much more likely person to have either needed or heeded the advice of a physician. The reproaches made to him by his wife Eleanore, who called him a "monk," "a rotten apple," and other endearing names in the same vein, though not necessarily the expressions of the whole truth about his physical constitution, do, nevertheless indicate a lack of virility and strength such as to require the attentions of a medical man. It is to him, therefore, that the letter was most probably addressed. A further

[13] Karl Sudhoff is disinclined to allow that Bernardus Provincialis was a pupil or assistant of Bartholomaeus because, according to Capparoni, the latter died in 1192 and Bernardus must have been his pupil at a time when Peter the Venerable was dead. The argument that because Bernard's commentary no longer exists, it did not exist, is feeble.

[14] M. Neuburger and J. Pagel, *Handbuch der Geschichte der Medizin*, begründet von Th. Puschmann, I, Jena 1902, pp. 645-6.

[15] G-J. Witkowski, *Comment moururent les rois de France*, Paris 1920, p. 20.

pointer in this direction is that Peter the Venerable is more likely to have suffered from various ailments towards the end of his active life rather than in the vigour of his young manhood, and this would indicate a time about 1150 rather than 1136 or 1137 when Louis VI died.

As a result, we may perhaps say that the letter to the king of France was written by Bartholomaeus of Salerno about the middle of the twelfth century, that it was brought by the same Bernard who had already been to Cluny [16] and that on this account it found its way into a French manuscript, where it has remained unnoticed ever since.

The text is found on fols. 90v-91r of Ms. 290 of the Bibliothèque Municipale of Troyes, a twelfth century codex containing the biblical compilations, the *Historia Ecclesiastica*, of Peter of Troyes. It formerly belonged to the collegiate church of St.-Etienne de Troyes. The other text that accompanies it has been published by Dom Leclercq.

[fol. 90va] Epistola Ma[gistri] Bartholomei ad Regem Francorum.

Lodouico Dei gratia regi Francorum Ma[gister] Bartholomeus: Saluari per eum qui dat salutem regibus.[1]

Regalis thesaurus non solum debet esse in auro et argento, uerum etiam in preciosis medecinis que ualeant salutem custodire et egritudinem, si acciderit, expellere. Quid enim prodest aurum et argentum accumulare, nisi corpus seruetur incolume? Nichil est preciosius salute; sine ea, cetera omnia sunt inutilia. Esto igitur sollicitus circa tue salutis custodiam, ut sis strenuus et ualidus ad tractanda negocia regalia; habeas in memoria illud prouerbium: "Reges et presides non decet esse desides." [2] Quia igitur desidero te sanum esse et incolumem, uolo te breuiter instruere qualiter debeas te continere in singulis anni temporibus.

Debet enim dieta mutari secundum mutationem temporis, ut si tempus sit calidum et siccum utendum est dieta frigida et humida, ut distemperata qualitas temporis reprimatur contraria qualitate diete, et, ut breuiter dicam, in omni tempore disparata utendum est dieta contraria tempori. Verbi gratia, si tempus sit calidum et siccum, utendum est dieta frigida et humida; in humido sicca. Item sciendum est quod non in omni tempore recipiendi sunt cibi in eadem quantitate. In hyeme itaque debemus multum comedere et parum bibere, tunc enim clausi sunt pori corporis humani et remanet intrinsecus calor naturalis circa loca digestionis, qui sufficit ad faciendum bonam digestionem, quamuis cibi sumantur in magna quantitate. Potu uero parcendum est: tunc enim habundant humores propter qualitatem hyemis. In estate uero contrario facere debemus, id est, multum bibere et parum comedere. Tunc enim aperti sunt pori in corporibus nostris humanis, per quos exalat calor naturalis et relinquit loca digestionis. Ideoque si tunc cibaria sumantur in magna quantitate

[16] H. Quentin, *loc. cit.*, p. 85: "Cum enim anno praeterito Cluniacum venissem. . . ."

[1] Cf. Ps. 143, 10.

[2] Wipo, *Proverbia*, 65, ed. H. Bresslau, *Monumenta Germaniae Historica, Scriptores rer. Germ. in usum scholarum*, 1915, p. 70.

indigesta remanent propter defectum caloris, sed largo potu in sequenti utendum est, quia tunc desiccantur corpora nostra ex siccitate temporis.

Item considerandum est utrum cibus uel potus sit calidus uel frigidus [fol. 90^{vb}] uel siccus uel humidus, digestibilis uel indigestibilis, constrictiuus uel laxatiuus. Nam calidus utilis est frigidis, frigidus calidis, siccus humidis, humidus siccis. Digestibilis frigidos uentros habentibus, indigestibilis calidos, laxatiuus constipatis, constrictiuus laxatis.

Item quantitas cibi attendenda est, scilicet, ut sit cibus modo multus, modo paucus, modo mediocris. Nam multo cibo reficiendi sunt, qui uentros habent calidos, quamuis paruum habeant appetitum, mediocri qui uentres habent temperatos. Numerus etiam refectionis attendendus est. Quidam uero bene se habent, cum semel reficiuntur in die: male uero, cum bis aut ter aut sepius. Alii uero econtrario. Et quoniam somnus et uigilie, exercitium et quies et accidentia animi attenduntur in dieta, aliquid de his dicendum est.

Illi igitur qui naturaliter sunt humidi, uti debent breui somno, uigilie namque desiccant: prolixo sicci, prolixius enim somnus humectat. Exercitium confert humidis et frigidis, nam calefacit eos et consumit superfluam humiditatem eorum. Quies uero confert calidis et siccis, quia infrigidat eos et humectat. Nocet humidis et frigidis, augmentat enim frigiditatem et humiditatem eorum. Accidentia animi dicuntur ista: gaudium, timor, spes, dolor, ira, tristicia et cetera huiusmodi, que omnia desiccant, preter gaudium quod humectat. Quedam enim calefaciunt, ut ira, que prodest humidis et frigidis, ut sunt flegmatici et melancolici.

Restat dicere de balneo et coitu. Hec enim quandoque necessaria sunt humano usui. Balneum aliud est calidum, aliud est frigidum; utrumque replet et remollet, et utrumque quosdam calefacit, quosdam infrigidat. Si quis enim balnet se in aqua calida quousque calore balnei aperiantur pori usque in profundum, calor interior euaporat [fol. 91ra] per poros apertos; et ita infrigidatur post balneum calidum, si quis nimis longam moram in eo fecerit. Sed si quis in eo mediocriter moratus fuerit, calore ipsius confortatur calor naturalis, et hoc modo calidum balneum confert eis qui indigent calefactione humida et repletione, quia eos calefacit, replet et remollit. Si quis in frigido balneo balneauerit se tamdiu donec frigiditas penetret usque in profundum, per eamdem frigiditatem suffocatur calor naturalis, qui est in uenis et arteriis. Si quis uero in balneo frigido tamdiu sederet donec opilentur pori cutis, retinetur intrinsecus calor naturalis, nequiens exalare propter pororum opilationem, et sic calefiunt ex balneo frigido, qui eo utuntur mediocriter, ita ut predictum est, testante ypocrate qui ait: "In iuuene carnoso estate media aque frigide infusio caloris facit reuocationem."

De coitu sciendum est quod ipse nocet multis et maxime siccis et macilentis, quia eos magis desiccat et extenuat. In coitu namque exalant spiritus et calor naturalis, unde membra debilitantur. Ut enim ait Galianus (*sic*): "Spiritus est causa fortitudinis membrorum, calore indiminuto per exalationem remanet cibus indigestus, ex quo indigesto nascuntur humores superflui, unde proueniunt multe infirmitates." Et sciendum est quod coitus nocet omnibus cuiuscumque fuit complexionis uel habitudinis, si immoderate fiat, aut sepius quam debeat. Omnes enim eneruat propter supradictam causam. Confert uero si moderate fiat, et in competenti tempore, scilicet, postquam digestio fuerit completa. Debet igitur, qui

coire desiderat, tamdiu morari post comestionem, quousque stomachus uacuus fuerit et digestio completa. De dieta ista sufficiant. Nunc dicendum est de medicina.

Medicina alia est confortatiua [fol. 91rb] alia est laxatiua. Confortatiua presentem sanitatem conseruat, laxatiua a futura habitudine mala preseruat. Confortatiua autem tribus modis operatur, calefaciendo, infrigidando, mediocritatem conseruando. Calefaciendo, ut si quis habeat stomachum infrigidatum, detur ei diacitoniten [3] calidus, diamilon et similia; diacitoniten detur electuarium de coctanis, diamilon de maluis. Infrigidando, ut si quis habeat epar calefactum dantur ei epar infrigidantia, ut rosata nouella, rodosaccara triasandalia et cetera huiusmodi. Mediocritatem conseruando, ut diamargariton, dianteos et similia. Omnia etiam dicta medicamina utilia sunt ab egritudine conualescentibus et debilem uirtutem habentibus. Notandum est quod egrotantium alii egrotant ex aliquo humore, alii ex sola qualitate. In his ergo qui egrotant ex humore, considerandum est quis humor habundet. Et si sanguis superhabundet, flebotomia est necessaria. Si alius humor, purgandus est cum laxatiua medicina, que purgat illum humorem qui est in causa. Illis qui paciuntur ex sola qualitate est danda medicina laxatiua, sed talis dumtaxat que sit distemperata et contraria qualitate. Verbi gratia, si quis distemperatus fuerit in calore, danda est ei aliqua medicina contra calidam discrasiam, ut est syropus rosaceus uel uiolaceus, uel aliquod electuarium quod eum infrigidet, ut est triasandale et cetera huiusmodi

Hec tibi sufficiant ad presens. Alia uice supplebimus quod modo minus fecimus.

Incipit medicinae doctrina de quatuor temporibus anni.[4] Incipiente hyemis tempore a vii Idus Nouembris usque in viii Idus Februarii, crescit flemma, ex qua nascitur hominibus frequenter catarus, distillatio urine, tussis plurima, punctio lacrimarum, caligo oculorum, tinnitus [fol. 91va] aurium et odorari nichil possunt. Tali igitur tempore, utere calidis et laxatiuis cibis et optimis piper habentibus. Oportet etiam uti sinape ualdeque corpus excitare, moratum bibere, raro laxare, caput uero sine intermissione purgare, uino indulgere, ueneri aliquando non parcendum. Veris incipiente tempore, a viii Idus Februarii usque in viii Idus Maii, hoc tempore augentur hominibus humores et dulcis sanguis. Ideo utere bene olentibus cibis et acerrimis. Estas a vii Idus Maii sui inicii gaudet, in viii Idus Augusti suo fine concluditur. His diebus crescit bilis amara et colera rubea: utere cibis dulcibus, uino indulge, ueneri parce, quia ueneris nimietate uirtus minuitur et debilitatur stomachus, totum corpus tremor inuadit. Ieiunia minime exequere. Autumpnus a vii Idus Augusti exordium sumit et in viii Idus Nouembris spacio dierum suorum terminatur, in quibus colera nigra crescit. Oportet in hoc tempore uentrem purgare et cunctis uti cibis dulcibus et bene olentibus et frigidioribus et qui uentrem molliunt. Sepe uomitum prouocare.

His omnibus suis temporibus utere et tocius anni cursum cum salute transies sine auxilio medicorum.

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[3] This and other terms mentioned here are explained in R. James, *Medical Dictionary*, II, London 1745, under the letter D.

[4] A marginal note adds: Item de dietis totius anni.

THE SIGNIFICANCE OF DISTILLATION IN RENAISSANCE MEDICAL CHEMISTRY

ROBERT MULTHAUF

I. The Alchemists

The importance of distillation in the history of alchemy has recently been emphasized by Kraus in his study of Jābir ibn Hayyān. According to Kraus, the alchemical practice represented by the Jābirian writings was characterized by an attempt to prepare elixirs for metal ennoblement through the distillation of organic—particularly animal—matter, a somewhat revolutionary conception which Kraus associates with the discovery of sal ammoniac. Jābir held the metals to be generated from mercury and sulphur, but he does not seem to have been inclined towards the mineral kingdom as a field for alchemical experimentation.[1]

Modern distillation, however, appears to have been developed in several stages over a long period of time,[2] and its influence on alchemists and chemists seems to have waxed and waned in response to new discoveries or to its compatibility with prevailing theories. The more influential European alchemical texts of the twelfth century, such as *De aluminibus et salibus*, and of the thirteenth, such as those associated with Michael Scot and the Latin Geber, indicate that interest was centered at that time on experimentation with the materials of the mineral kingdom.[3] Distillation, is not particularly prominent among the processes of these alchemists, and there is some evidence at this time of a particular aversion to the distillation of animal matter.[4] Nevertheless, it is to this period that

[1] Paul Kraus, *Jābir ibn Hayyān* (*Mémoires présentés à l'Institut d'Égypte*, t. 45), Le Caire, 1942, pp. 1-9, 41.

[2] See R. J. Forbes, *Short History of the Art of Distillation*, Leiden, 1948.

[3] Julius Ruska, *Das Buch der Alaune und Salze*, Berlin, 1935; S. H. Thomson, "The Texts of Michael Scot's Ars Alchemia," *Osiris*, *5*: 523-59 (1939); J. W. Brown, *An Inquiry into the Life and Legend of Michael Scot*, Edinburgh, 1897, Appendix III, pp. 240-69; E. J. Holmyard, *The Works of Geber Englished by Richard Russel, 1678*, London, 1928; E. Darmstaedter, "Liber Claritatis," *Archivo di Storia della Scienza* (after 1926, *Archeion*), *6*: 319-30 (1925), *7*: 257-65 (1926), *8*: 95-103, 214-26 (1927), *9*: 61-80, 191-208, 462-82 (1928).

[4] The *Speculum alchemiae* of pseudo Roger Bacon, which is thought to belong to the late thirteenth century, declares that "it is a surprising thing that a certain prudent man should found his intention on animal and vegetable substances which are remote . . . ," (T. L. Davis "The Mirror of Alchemy of Roger Bacon," *Journal of Chemi-*

most authorities assign the discoveries of the mineral acids and alcohol, which were certainly due to some notable improvements in the technique of distillation.[5] The contradiction suggested here may be more apparent than real, for certain works of the late thirteenth and early fourteenth centuries suggest that an awareness of the significance of these new materials was a matter of slow development.[6] Perhaps the discoverers were not as conscious of the importance of their discoveries as we are as we scrutinize these early works for the first indications of the mineral acids and alcohol. In any case, the exploitation of the acids, and a more than full measure of recognition of the importance of distillation, appear in the middle of the fourteenth century when various combinations of mineral acid dissolution and distillation, interpreted as a successive chemical refinement towards the elixir, constitute very nearly the whole of alchemical practice,[7] and in the following century we encounter the complaint of Bernard Trevisan against the predominance of this procedure among gold-makers.[8]

The hoary alchemical practice of "separation of the elements" also played a great role in the alchemy of Jābir ibn Hayyān, where it was conceived as the immediate result of distillation and the source of the ingredients of the elixir.[9] Among the popular alchemists of the thirteenth century, however, this practice, like distillation itself, seems to have been of no particular interest, for it appears in their works only incidentally and obscurely.[10] With the "renaissance" of distillation in the fourteenth century we find alchemists again setting up a group of intermediary dis-

cal Education, 8: 1947 (1931). The early fourteenth century *Nova margarita pretiosa* of Petrus Bonus gives vent to the same sentiment. (J. J. Manget, *Bibliotheca chemica curiosa*, Genevae, 1702, vol. II, p. 46 c).

[5] Forbes, *op. cit.*, p. 87; E. O. von Lippmann, "Das Sammelbuch des Vitalis de Furno und seine Bedeutung für die Geschichte der Chemie," *Chemiker-Zeitung*, 46, 25 (1922).

[6] The gap between the thirteenth century works associated with Scot and Geber and the radically different alchemies of the middle fourteenth century remains to be filled in intelligibly. The *Testamentum* attributed to Raymond Lull seems to show the trend of alchemical thought which *might be expected* during this period, but there is much disagreement as to the date of composition of this work.

[7] John of Rupescissa, *Liber lucis*, in Manget, *op. cit.*, vol. II, pp. 84-87; Ortulanus, *Practica vera alkimica*, in L. Zetzner, *Theatrum chemicum*, Argentorati, 1613-61, vol. IV, pp. 912-34; anonymous, *Rosarius minor*, in Zetzner, vol. II, pp. 406-22.

[8] *Liber de secretissimo philosophorum opere chemico*, in Manget, *op. cit.*, vol. II, p. 390 a.

[9] Kraus, *op. cit.*, pp. 5-7.

[10] This applies to all of the works mentioned in note 3 above, although the Scotian work edited by Thomson exhibits somewhat more interest in distillation than do the others.

tillation products between the raw material and the elixir, but rather than following Jābir in conceiving the elixir to be a compound of distillation-purified ingredients, the alchemists of this period tended to regard it as the final product of a succession of distillations each of which increases the degree of purity of the product of the preceding process.[11] These intermediates could be designated "elements" only insofar as the elements could be conceived as having different degrees of purity. This view was not generally adopted, and the intermediate products were usually given new names, the most consistent of which was "fifth essence" (*quinta essentia*), a name which may have been taken over from the distillers of alcohol.

Like the mineral acids, alcohol first appears in the literature of chemistry shortly before 1300, under such names as *aqua ardens, aqua vitae*, and fifth essence.[12] Our earliest references to alcohol are concerned with its use in medicine, especially for its supposed power to preserve the human body.[13] Since wine had long been in use as a medicine, and for other self-evident reasons, it is hardly surprising that this more active derivative of wine should rapidly achieve a medical reputation, a reputation the degree of which may be inferred from the name given to it. So far as the mists which still shroud the history of distillation in the twelfth and thirteenth centuries permit us to know, the adaptation of the Aristotelian fifth element to mundane purposes was probably the work of the early distillers of wine. John of Rupescissa, who attempts to explain its significance, says that the fifth essence is "related to the four qualities as heaven is related to the four elements."[14] This would seem to be a variation on the Aristotelian system, but not a very intelligible one, and in most cases where the term was used it appears to have represented a sublunary version of the Aristotelian fifth element, since descriptions of its

[11] Although disinterest in "separation of the elements" is general in the works mentioned in note 7 above, only the *Liber lucis* attributed to Rupescissa exhibits clearly the idea of stepwise purification through successive distillations. But the idea seems to be implied beneath the chaotic arrangement of *Practica vera alkimica* and *Rosarius minor*.

[12] Forbes associates these different names with the different grades of dehydration of alcohol (*op. cit.*, chapter 4).

[13] Some of the earliest references are in the late thirteenth century *De virtutibus aquae vitae* of Thaddeus Alderotti, and two early fourteenth century works, the *De vinis* of Arnald of villanova and the *Pro conservanda sanitate* of Vitallis de Furno.

[14] John of Rupescissa, *La vertu et proprieté de la quinte essence*, translated by Antoine de Moulin Masconnois, Lyon, 1549, p. 13. This is apparently the first printed edition of this work, at least the first under the name of Rupescissa. On the manuscript versions see, L. Thorndike, *History of Magic and Experimental Science*, vol. 3, New York, 1934, Chapter 22.

preparation characterize it as a higher component which is recovered from matter when the elements have been removed. This was a decided deviation from the Aristotelian system, for whereas the fifth essence had served Aristotle as a material cause for the superlunary world, its interest to the Renaissance was not cosmological, and it was commonly regarded as a kind of super-material, with appropriately superior, but nevertheless fundamentally mundane, properties. No one appears to have even considered whether or not the superlunary world was made of alcohol. The success of alcohol as a medicine seems to have had very far-reaching consequences for chemistry as well as for medicine, for the process of distillation by which it was prepared was recognized as an alchemical process, and there was no general agreement as to whether the efficacy of this medicine was due to the material of its origin, or to the process by which it was prepared. John of Rupescissa belonged to the latter school, and hence drew the obvious conclusion that the same process might yield other medicines when applied to other materials. And being, as it appears, himself an alchemist, Rupescissa chooses as materials of the greatest promise for the extraction of medical fifth essences the mineral materials of alchemy, especially mercury, antimony, and gold![15] This curious rationalization would appear to have inaugurated the era of medical chemistry, for that movement retained through the period of its apogee in the sixteenth century the stamp which Rupescissa had given it in his treatise on the fifth essence.[16]

It is clear, therefore, that distillation was at the root of the development of the science of matter during this period. But in alchemy, however intrigued the gold-makers may have been by the new possibilities created by this new technique, they were no more successful than before in bringing about metal ennoblement, and in the fifteenth century we find expressions of disillusionment.[17] This disillusionment may well have been a cause of the evident migration of large numbers of chemists in the sixteenth century from gold-making to medicine. Alchemy continued to flourish, but from about 1500 its orientation turned increasingly from technology to philosophy,[18] and those writings which manifest concern

[15] Robert Multhauf, "John of Rupescissa and the Origin of Medical Chemistry," *Isis* *45*: 359-367 (1954).

[16] Robert Multhauf, "Medical Chemistry and 'The Paracelsians,'" *Bull. Hist. Med.* *28*: 101-126 (1954).

[17] See, for example, Bernard Trevisan, *Liber de secretissimo philosophorum opere chemico*, and *Ad Thomam de Bononia . . . Responsio*, in Manget, *op. cit.*, vol. II, pp. 388-409.

[18] The emergence of this new type of alchemy is frequently noted, but the period of its

with chemical technology are increasingly found in the field of medical chemistry rather than in gold-making alchemy.

II. Sixteenth Century Herbalists and Pharmacists.

The condition of medicine was not static during the period of the aforementioned developments in alchemy. The humanistic movement towards the recovery of the Greek texts of ancient medicine, and the beginning of dissection of human bodies, events which were to overturn first medieval medicine and then the reestablished classical system itself, were manifest as early as the fourteenth century. Daremberg, considering the medical writers of this century, shows that their interests were nearly as variegated as were those of later centuries.[19] It appears, therefore, that it would be a mistake to suppose that the controversy which arose in the sixteenth century over "medical chemistry" was in any degree due to the mere resistance of a hidebound medical profession to all innovation. Among the late medieval medical innovations which seem not to have aroused any particular antagonism on the part of the profession is the application of distillation to the pharmacopoeia.[20]

Into one of the nine categories of late medieval medical writing mentioned by Daremberg, that of the authors of works on the preservation of health, we may place the aforementioned early treatises on alcohol. The extension of vegetable distillation to other materials had been among Rupescissa's suggestions, but being particularly interested in the mineral kingdom he failed to develop this suggestion very extensively. The first distiller who attempted a comprehensive exploitation of this possibility appears to have been Hieronymus Brunschwygk, whose *Liber de arte distillandi de simplicibus*, published at Strassburg in 1500, undertook to apply distillation to the roster of herbs which the herbalists of the previous generation had established. This work, however, not only expanded the practice of vegetable distillation, but introduced a theoretical concept

emergence still awaits the kind of detailed investigation which von Lippmann and others have given to early alchemy. See John Read, *Prelude to Chemistry*, London, 1936, p. 80; F. S. Taylor, *The Alchemists*, New York, 1949, p. 214.

[19] Ch. Daremberg, *Histoire des sciences medicales*, Paris, 1870, vol. I, pp. 292-96.

[20] In considering the controversy over medical chemistry it is necessary to note that the anti-chemical polemic was chiefly directed against those who proposed chemically prepared remedies for specific uses in internal medicine. Those who recommended such remedies for such vague purposes as "preservation of the body," or who merely listed them without reference to their applicability, seem to have been either accepted or, more probably, ignored by the medical profession.

which was to be of the greatest importance to medical chemistry, for Brunschwygk defined distillation as:

> nothing else but the separation of the gross from the subtile and the subtile from the gross, the breakable and destructible from the indestructible, the material from the immaterial, to make the body more spiritual, the unlovely lovely, to make the spiritual lighter by its subtility to penetrate with its virtues and force which are concealed in it into the human body to do its healing duty.[21]

This early enunciation of the doctrine of "the separation of the impure from the pure," which was to be a rallying cry of the exponents of medical chemistry, was nothing more than the definitive statement of an old alchemical principle which, like "separation of the elements," had followed in alchemical thought the fortunes of distillation in alchemical practice. Its emergence at this time is undoubtedly attributable to this circumstance. Brunschwygk made no criticism of the traditional pharmacopoeia, but since one of its chief characteristics was that its drugs were mixtures, frequently so complex that it has been called "polypharmacy," here was a doctrine of the preparation of drugs so diametrically opposed as to assume revolutionary significance. Yet it does not appear to have aroused opposition. Perhaps this is explicable on the grounds that Brunschwygk, as a surgeon, was beneath the notice of the medical profession, or that he did not advocate mineral drugs (although he did introduce them in the 1512 edition of his work). It must also be noted, however, that Brunschwygk never hurled any "Paracelsian" anathemas at the profession.

The extraction of vegetable "waters" through the application of distillation to the materials of the herbalist continued to attract the attention of sixteenth century pharmacists. Matthiolus' commentary on Dioscorides (1554) incorporated an appendix on the distillation of waters from plants.[22] Lonicer's herbal (1555) began with that topic, and his description of distillation suggests the subdivision which was being made of distillate fractions which was to result, in the course of the century, in the establishment of a greatly expanded repertoire of distilled preparations:

> after a wateriness and raw undigested phlegmatic moisture follows next a better digested material, finer and subtiler; [then] follows a fattiness and oiliness which

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[21] *Liber de arte distillandi de simplicibus*, Strassburg, 1500 (The title page is missing. Identification is inserted by the library of Stanford University. The first page begins, "Hie anfahen ist das buch genant Liber de arte distillandi . . ."), p. 1.

[22] *Commentaires de M. Pierre Andre Matthiole, Medecin Senois, sur les six livres de Ped Dioscor. Anazarbeen de la matiere medecinale.* Mis en François par M. Jean des Moulins. Lyon, MDLXXIX, pp. 849-52.

also may drive off something out of the solid residue. And finally the artist and alchemist usually draws out the fourth element and at last the fifth essence (*fünfte Wesen*), called quinta essentia, as shown further in books in alchemy, but this is not part of our purpose here.[23]

As we have noted in the case of Brunschwygk, mineral distillation was never very remote from the thoughts of these herbal distillers, although the materiae medicae more strictly in the tradition of Dioscorides and Constantinus Africanus best exhibit the development of the repertoire of mineral distillates. Lonicer discusses a few minerals, noting that this is appropriate since metals and earths are the "plants" (*Gewächse*) of the earth.[24] The *Liber servitoris* of Albucasis does not appear to mention distillation, but subsequent references to Albucasis indicate that he was quite an authority on the distillation of mineral materials.[25] The mineral acids, in varying degrees of purity, were the most common representatives of this group, sometimes being described as "waters" (e. g., *aqua fortis*), sometimes as "oils" (e. g., *oleum vitrioli*). On the whole, the distillation products of minerals were more frequently regarded as oils, probably because of the primacy of oil of vitriol, and the interest which these pharmacists already had in such nondistilled mineral oils as petroleum. Antonius Brasavola and the commentaries of Johannes Manardus and Jacques Sylvius on Mesue's *Grabadin* also have much to say on the subject of these oils.[26] Conrad Gesner's *Thesaurus euonymi philiatri* systematizes to some extent these random indications, and in so doing points up the importance of distillation. Speaking of his book of secret remedies, Gesner says:

it teaches of those medicines which are not taken whole or in substance, but applied in the purer parts, that is, in liquors, waters, oils, or juices, secreted or abstracted through distillation or other artificial methods.[27]

Gesner describes the preparation of an impressive array of fifth essences,

[23] Adam Lonicer, *Vollständiges Kräuter-Buch*, von Herrn Peter Uffenbach uebersehen, Augsburg, 1783, p. 3.

[24] *Ibid.*, p. 705.

[25] *Liber servitoris, id est liber 27. Bulchasim benaberazerin, translatus a Simone Ianuensi interprete Abraham Iudaeo Tortuosiensi*, in Ioannis Mesuae Damasceni *Opera*, Venetiis, 1623, II, fol. 240-251 v. He is one of the most frequently cited authorities. See, for example, Conrad Gesner, *Thesaurus euonymi philiatri*, Lugduni, MDLV, pp. 35, 391, 412, and Jean Costaeus' commentary (1578) on Mesue's *Grabadin*, in the latter's *Opera*, Venetiis, 1623, fol. 193 v.

[26] Antonius Brasavola, *Examen omnium simplicium*, Lugduni, MDXXXVII, pp. 508-15; Joannis Mesuae Damasceni *Opera*, Venetiis, 1623, I, fol. 192-194.

[27] *Op. cit.*, Argumentum.

waters, and oils from all of the three kingdoms, concluding with a few remedies "non-alchemical, that is, not distilled or sublimated." [28]

The complexity of the assortment of distillates which were described in these works can be illustrated by those derived from calcanthum (vitriol), which was probably the most popular mineral raw material of sixteenth century pharmacology. The account of Winter von Andernach, clearer than most, speaks of the preparation through distillation of water and oil, *spiritus crassiores*, of calcanthum, and finally of the *subtilior liquor*, fifth essence of calcanthum. The *spiritus crassiores* may further appear in the form of the vulgar oil, red oil, sweet oil [ether], or *sulphur vitriolatum*.[29] But classification does not appear to have been of particular concern to these writers, and generally breaks down badly when it gets below the highest category, which is consistently reserved for the fifth essence. Indeed, the fifth essence itself is not treated by Lonicer and Gesner with as much respect as their descriptions of it would lead one to expect, and Matthioli and Winter of Andernach mention it only occasionally and casually. From the point of view of chemistry, this relative unconcern with the theoretical aspects of distillation constitutes one of the chief differences between this group and the more strictly chemical distillers.

III. The Medical Chemists.

With the appearance of Paracelsus the medical profession was forcibly acquainted with the existence of a rival school which challenged the claims of traditional medicine. This development was in no small degree owing to the appearance on the scene of Paracelsus himself. But in addition to the personality and the medical doctrine of the master, the new school included in its armory a battery of new drugs, mostly "chemical," if not alchemical, in nature, and the acrimonious controversy which developed between the profession and this new school was more directly concerned with the use of these drugs than with the theoretical aspects of Paracelsus' medical doctrine. In respect to pharmacology this school depended scarcely less than did the writers we have discussed earlier upon distillation, and it will be noted that in both this and its choice of materia medica it was strictly in the tradition of John of Rupescissa.

Rupescissa's system of medicine, if it may be so called, seems to have excited the imagination of the chemists of the two centuries after him, for

[28] *Ibid.*, p. 416.

[29] *Ioannis Guintherii Andernaci De medicina veteri et nova*, Basiliae, MDLXXI, Commentary two, pp. 677-680.

first copyists and then editors seem to have been uniformly inspired to augment the medico-chemical observations of his *De consideratione quintae essentiae* with their own. This practice seems also to have obtained to some extent among the editors of the most important descendent work, Paracelsus' *Archidoxies*, with the result that it is virtually impossible to elucidate these works chronologically. It is clear that much of the elaboration which occurred between Rupescissa's original work (ca. 1350) and the publication of Paracelsus' *Archidoxies* (1569) was made by those who reproduced Rupescissa's manuscript.[30] The earliest printed version seems to have been one attributed to Raymond Lull, which appeared in 1514.[31] Ten years later another elaborated version appeared from the hand of Philip Ulstad,[32] and not until 1561 did the work appear in print under the name of Rupescissa. The analysis upon which my description of this literature is undertaken is based upon a comparison of the more or less established doctrine of Archidoxies with four sixteenth century published works, the composition of which precedes, although not certainly, antedate the composition of *Archidoxies*. These are *De consideratione* in one version published under the name of Lull and in two published under the name of Rupescissa, and the *Coelum philosophorum* of Ulstad.[33]

The most obvious superiority of *Archidoxies* lies in its relatively clear differentiation of the various pharmaceutical categories with which this school was concerned, topics which are indicated by the subheadings as follows:

Book I. On the prologue and microcosm.
III. On the separation of the elements.
IV. On the fifth essence.
V. On *arcana*.
VI. On *magisteria*.
VII. On specifics.
VIII. On elixirs.
IX. On external medicines (*extrinseca*).[34]

[30] On the variation in the contents of the manuscripts see Thorndike, *op. cit.*, ch. 22.

[31] See Thorndike, *op. cit.*, p. 355, note 37. I have used *Raymundi Lulii de secretis naturae sive quinta essentia libri duo*, Argentorati, MDXLI.

[32] *Le Ciel des philosophes*, Paris, 1550. The first edition appeared in 1526 or 1528.

[33] Three of these are cited above in notes 14, 31, and 32. The other is John of Rupescissa, *De consideratione quintae essentiae rerum omnium*, edited by G. Gratarolo, publication data obliterated [identified by the Library of Congress as the Basel, 1561, edition].

[34] *Archidoxies* was originally subdivided into ten books, of which the tenth, according to Paracelsus, was left unwritten (Paracelsus, *Sämtliche Werke*, ed. Sudhoff, München,

All Books except the first are chiefly concerned with chemical preparation in general and in detail. The fifth essence appears to have been Paracelsus' most highly regarded chemical preparation,[35] and his treatment of it differs from that of Rupescissa chiefly in that he has divested it more unequivocally of its close association with alcohol and at the same time of its special association with preservative properties. These aspects of the Rupescissan fifth essence appear in *Archidoxies* in the Book on "elixirs." Paracelsus' description of the preparation of fifth essences is also expanded and systematized beyond the earlier manuscripts of Rupescissa, although the published editions of Rupescissa's work too show development in this direction.[36] It is not clear that Rupescissa was interested in the "separation of the elements," but here again his copyists and editors seem to have added something,[37] and in the work of Ulstad "separation of the elements" appears in nearly as fully developed form as in *Archidoxies*.[38] In its full treatment of both of these ideas the latter

1922-23; vol. III, pp. 95-96). Some editions include a tenth book, but Sudhoff considers it spurious. Various editions subdivide the balance of the work in more than one way to make nine books, and in Sudhoff's edition there are actually only eight, as there is no Book II.

[35] It seems to me that the elaboration of *Archidoxies* beyond that of earlier works does not obscure the fact that the fifth essence still holds first rank. E. Darmstaedter *Arznei und Alchemie, Paracelsus-Studien*, Leipzig, 1931, pp. 59-61, *Studien zur Geschichte der Medizin*, Heft 20, and T. P. Sherlock, "The Chemical Work of Paracelsus," *Ambix*, 3: 33-63 (1948), seem to give more importance to Paracelsus' *arcana*. This judgment, however, is based upon a consideration of Paracelsus' treatment of *arcana* in his later works in which its medico-philosophical importance was continuously augmented. And, as Sherlock admits (p. 37), Paracelsus' *arcana* often seem indistinguishable from his fifth essences. The fineness of the distinction between the two is also remarkable in the work of Libavius (see below, note 54).

[36] Compare the account of the fifth essences in the manuscripts of Rupescissa's work described by Thorndike (*op. cit.*, pp. 355-61, 725-34) with that in *La vertue et proprieté de la quinte essence*, translated by Antoine de Moulin Masconnois, Lyon, 1549, pp. 34-38, 51-84, 92-100. The Basel, 1561, edition contains other variations. Since Parcelsus' elaboration of the chemical entities of his predecessors depended to a considerable extent on his concealment of the solvents (real or imaginary) involved in preparing them, it seems to me that Sherlock goes too far when he says that Paracelsus' chemical ideas "go far beyond" those of the school of Rupescissa (*op. cit.*, p. 62). See also note 39 below.

[37] The edition attributed to Lull treats of "separation of the elements" in the same way as does Paracelsus, through dissolution followed by distillation, although pseudo-Lull's solvent is nostrum menstruum (*alcohol?*) (*op. cit.*, p. 15), whereas Paracelsus' is nitric acid and/or *aqua regia* (aquafort), a specificity which the latter unfortunately exhibits but rarely.

[38] Paracelsus' observation of the different colors of the solutions of metals in nitric acid (or *aqua regia*) is regarded by Sherlock as "an important step towards the recognition of compounds as falling into classes" (*op. cit.*, p. 48). It appears, however, that this same observation was made by Ulstad (*op. cit.*, p. 50 [erroneously numbered 42]),

work brings into relief a major deficiency of the school, for it reveals that the processes were not fundamentally different, if, indeed, they were even superficially different. It is anything but clear how Paracelsus' fifth essence differed from the lighter fractions produced in his separation of the elements.[39] To "that which, apart from separation or any preparation of the elements, can be extracted out of things," Paracelsus gives the name of *magisteria*, and here he would seem to have introduced something foreign to the Rupescissan tradition. The extracts and distillates by which he exemplifies his *magisteria*, however, are not outside of this tradition, and it remains a matter of conjecture whether or not Paracelsus' introduction of this category signifies an awareness of the inadequacy of the system of his predecessors.[40]

Students of Paracelsus tend to regard his conception of *arcana* as being at the heart of his *Naturphilosophie*, and regard it as binding together his doctrine of microcosm and macrocosm with his chemical and medical practice. This view, however, depends on a study of the concept as it appears in Paracelsus' later works, to which the conception of *arcana* in *Archidoxies* is regarded as little more than a first approach.[41] Considered without reference to Paracelsus' later works, the *arcana* of *Archidoxies* appear to be akin to the secret remedies with which contemporary "books of secrets" abounded, and they are also obviously related to the mercury and antimony preparations of the earlier works.

The dependence of this school on the process of distillation had a consequence which was not propitious for the development of chemistry. This was its preoccupation with the lighter fractions and its disdain for resi-

and by others during the sixteenth century (e.g., *Secreti diversi et miracolosi, racolti dal Falopia*, Venetia, 1578, pp. 201-202).

[39] Paracelsus' account of the metals is the most clear and consistent part of *Archidoxies*. His solvent for metals, as a prelude to "separation of the elements," is, as we have observed in note 37 above, nitric acid and/or *aqua regia*. The solvent through which the metals are prepared for separation of the fifth essence is not specified, since he merely says, "solvir den metallen zu wasser" (*Sämtliche Werke*, vol. III, p. 129). His solvent for extraction of *magisteria* from metals is "wol gereiniget circulatum" (*Sämtliche Werke*, vol. III, p. 158). Darmstaedter and Sherlock, in the studies cited above, attempt to decide what the solvents may have been in the latter two cases, but it is probably not unfair to say that the question remains undecided.

[40] *Sämtliche Werke*, vol. III, p. 153 ff. In practice his *magisterium* of metals was a supernatent fraction of an extraction by *circulatum*, that of "marchasites" was a distillate, and that of pearls, coral and gems, a calcination residue. Sherlock thinks that the process as applied to metals was derived from Rupescissa (*op. cit.*, p. 60), but Darmstaedter holds *circulatum* to be related to the famous "alkahest" and regards the process as an attempt to prepare solutions of metals without the use of corrosives (*op. cit.*, pp. 49-53).

[41] Darmstaedter, *op. cit.*, pp. 37-47; Sherlock, *op. cit.*, pp. 37-39.

dues. Even when Paracelsus has accomplished the momentous step of preparing acid solutions of the metals he seems to have regarded this process merely as a prelude to distillation.[42] Only occasionally and inconsistently does he exhibit interest in a residue, as in the chapter on *magisteria*, and even then he fails to demonstrate an awareness of the metallic salts. This circumstance in particular raises the question of whether *Archidoxies* deserves the high reputation as a chemical treatise that it has been given. The practical turn of mind, which we have observed in the herbal distillers which led them to neglect that distillate which they themselves regarded as the most estimable of all in favor of the more variegated and tangible waters and oils which their practice yielded, does not appear in *Archidoxies*. As a result the development of a systematic procedure for the preparation of metallic salts, which Paracelsus and others had approached so closely that they note the colors of metal-acid solutions, leads him to a new variation in the doctrine of "separation of the elements" rather than to the salts which, in the work of Libavius, were to appear as the basis of inorganic chemistry.

IV. The Late Sixteenth Century.

The definitive establishment of that school of medicine which relied particularly on the use of mercurial and antimonial remedies in internal medicine occurred in the last quarter of the sixteenth century, although its earliest well-known representatives, Joseph Du Chesne (Quercetanus) and Oswald Croll, flourished at the very end of the century. The idea that medical chemistry was the peculiar child of Paracelsus was already abroad at this time, but the question of the extent to which the mercurial and antimonial remedies of Du Chesne, Croll, and their successors are derived from Paracelsus is very much an open one. It must at least be said that they correspond only very tenuously to the chemical remedies in what is agreed to have been Paracelsus' chief chemical work, *Archidoxies*. This is illustrated by a consideration of the subject which is the particular concern of this paper, for distillation, which had dominated the chemistry of *Archidoxies*, is of only minor importance in Croll's *Basilica Chymica*, the most typical work of the school. The conclusion to be drawn from this is that medical chemistry, in what we may be justified in calling its classical form, was much less dependent upon the "distillation chemistry" of *Archidoxies* than is often supposed.[43]

[42] *Sämtliche Werke*, vol. III, pp. 108-109.

[43] There is some reason to believe, however, that Paracelsus' *Archidoxies* preparations

The development of the chemistry of mercury and antimony among the medical chemists, although it led to the gradual development of a chemical picture of these elements which corresponded not at all to the prevailing chemical doctrines of the time, does not appear to have led them to undertake a revision of those doctrines. Aside from their medical preoccupations, the followers of Paracelsus show themselves as much interested in distillation as the Master. The *Clavis totius philosophiae chymisticae* of Gerard Dorn, one of Paracelsus' early editors, despite its provocative definition of chemistry as "that philosophy which teaches the investigation of the latent forms of things in accordance with truth and not appearances," [44] is scarcely less dependent upon distillation than were its predecessors, and devotes most of its space to the familiar distillations of fifth essences from wine and the acid salts. The chemical section of Du Chesne's *Pharmacopoea dogmaticorum restituta* similarly places distillation at the head of his list of "operationes vulgans pharmacopoeorum," and, although he deals with *sales* as well as with "essentiae, magisteria, arcana, liquores, et sulphurei," it is evident in the treatment of metals that those *sales* which mineral acid technology had made available are scarcely noticed.[45]

Those pragmatic distillers whom we have spoken of as descended from the herbalists continued to flourish during this period, chiefly under the inspiration of Gesner. The influence of medical chemistry was not without effect, however, and just as was the case among the medical chemists we find here the introduction of certain anomalous chemical preparations which were not distilled. That "most excellent worke of distillation," *The New Jewell of Health* (1576), speaks very highly of "mercurie precipitate," and deals at length with the various antimony preparations of medical chemistry.[46] Similarly Jean Liebaut's book of medical secrets written "to give apothecaries some taste for distillation," takes passing notice of "antimony," "powder of mercury," and "artificial salts," [47]

were not actually his chief medicines. For example, one of the most popular remedies of late sixteenth century medical chemistry was *mercurius praecipitatus* (mercuric oxide), which was *not* prepared by distillation, and there is considerable evidence that this was also one of Paracelsus' own chief remedies (see Multhauf, "Medical Chemistry and 'The Paracelsians'" quoted above, note 16).

[44] Ed. Lugduni, 1567, p. 14.

[45] Ed. Venetiis, MDCXIIII, pp. 5-7. His preparation of metals is in his "De spagyrica mineralium, animalium et vegetabilium preparatione," pp. 1-4, which is appended to this edition of *Pharmacopoea*.

[46] Ed. *London*, 1576, pp. 109, 174 v ff.

[47] "Quatre livres des secrets de médecine, et de la philosophie chymique," Rouen, MVIC (sic) [this edition, published by T. Reinsart, is not mentioned by Eloy, Hirsch, or the Catalogue of the Surgeon General's Library], pp. iii, 199-216, 318-23.

and Giovanni Porta's *De distillationibus* includes a chapter on "salts," (all of which are of vegetable origin!).[48] Of more importance, however, were the indications which these works give of some consciousness, however slight, of the limitations of distillation. *The New Jewell* observes—we can hardly suppose for the first time—that some things cannot be distilled:

> if a man woulde distill any matter, which is destitute or lacking, the same moisture or licour that he searcheth and hopeth for: what is it any other thing (I pray you) than to desire wool from an asses backe, or to wryng water out of a pummyce stone?[49]

As we have seen in the case of Paracelsus, this problem had been resolved by those who prepared refractory materials for distillation by dissolving them in acid. There seems to have been some dissatisfaction with this procedure later in the century, however. Porta notes that if, in the process of separating fifth essences, "it has been necessary to add anything, it must be segregated after the separation." He has in mind particularly *corrosiva*, such as vitriol and alum, which are particularly hard to segregate. The task of making such segregations was not facilitated by his view that fifth essences are of various grades, depending upon their action (*ex operationum gradibus*), and:

> may be either oil, or salt, or water, or of extraction: some by sublimation, others by calcination, others by vinegar, wine, corrosive waters and such like . . .[50]

Indeed, even so enthusiastic a Paracelsian as Dorn does not seem to favor distillation of metals "with vinegar or acute solvents," for he prefers to distill them "without mixture, that is, by themselves."[51]

Despite Porta's somewhat radical conclusion that a fifth essence may be a salt, among those fifth essences which he describes in detail he includes only one residue, "salt" itself. Elsewhere in his work we find a few residues mentioned under *magisteria*, those mentioned being the product of calcination of gems and corals, which Paracelsus had also included under this heading. Porta's attempt to elucidate this entity beyond Paracelsus' description of "that which, apart from separation or any preparation of the elements, can be extracted out of things," consisted chiefly in the not

[48] Ed. Romae, 1608. It was originally part of his earlier works, from which my citations are taken, *Magiae naturalis libri viginti*, Amstelodami, 1664 [first edition, 1589], p. 435.

[49] *Op. cit.*, p. 3 v.

[50] *Op. cit.*, p. 424.

[51] *Op. cit.*, p. 89.

very helpful notation that it is something between a "spirit" and a "tincture." [52] But it was nevertheless from this conveniently amorphous concept that something like modern chemistry finally emerged with the publication, in 1597, of the famous *Alchemia* of the Jena professor of history and poetry, Andreas Libavius. Chemistry (Chymia), according to Libavius, is "the preparation of chemical species," and may be subdivided as follows:

I. *Magisteria*, chemical species extracted from all extraneous material, worked to remove the external impurities, and exalted.
II. *Extracta*, that which is extracted from solid bodies, leaving behind the crassness of the elements.
III. Composite species, that which is compounded from the prepared simple substances.[53]

Most of the lore of distillation chemistry appears in part two, on *extracta*, and here we find the waters, oils, and fifth essences of his predecessors described in detail, in greater detail, in fact, than any of them had offered. But even the fifth essence, which he calls "a mysterium exalted to the purity of the celestial nature," is rigorously restricted to its proper place, a not very prominent one, in his system of classification.[54] A few naturally occurring salts also appear among the *extracta*, but it is chiefly among the *magisteria* that we find the roster of synthetic salts prepared by acid dissolution of the metals. The genesis of modern inorganic chemistry was not an easy process, as is shown even by the work of Libavius, and the salts do not simply appear as such. But the prejudice against residues which was so pronounced a characteristic of the chemistry of the sixteenth

[52] *Op. cit.*, pp. 426, 428-429.

[53] Andreas Libavius, *Alchymia* (title page missing; identified by the Library of Yale University as the edition of Francofurti, 1597), pp. 85, 242, 409.

[54] *Ibid.*, p. 260. Libavius' classification of "chemical species" is not given in any succinct form. He has a strong penchant for classification, however, especially by dichotomy, and it is possible by a perusual of his work to construct a table of classification, as is illustrated in the following table which I have constructed to show the position of his "fifth essence."

- Alchemia
  - Encheria (techniques)
  - Chymia
    - Magisteria
    - Extracta
    - Species composita
      - Ens prima
      - Essentia
        - Extracted juices
        - Mysteria
          - Quintae essentiae
          - Arcana

It will be noticed that the close similarity between *quintae essentiae* and *arcana* is reminiscent of the position these two occupied in Paracelsus.

century simply does not exist for Libavius, and in the course of his work, which, chemically speaking, might be described as a *tour de force* on the mineral acids, residues abound among the products of processes where he utilizes the acids variously to render the metals potable, powdered, fixed, volatile, calcined, vitrified, transmuted, and converted to crocus.[55] The task of making these residues intelligible from the point of view of chemistry remained for others, but Libavius, in breaking the hold of distillation on the science of matter, at least brought within the pale of chemistry these lowly substances from "the crassness of the elements," and in so doing performed a service which more than deserves the honor that has been accorded him.

V. Summary.

From the end of the thirteenth century some knowledge of alcohol and of those corrosive liquids which we know as the mineral acids became general among practitioners of the chemical arts. Alchemical practice, to whose experimentation the discovery of alcohol as well as that of the acids was probably due, turned increasingly to the investigation of these chemical prodigies and to distillation, the process through which they had been discovered. The theory of gold-making alchemy was reoriented towards this new practice, with the result that the prevailing conception of the alchemical work in the late middle ages came to be one of a purification or "exaltation" of matter through a succession of acid treatments and separations of the purer components through distillation until the elixir was finally attained.

The use of organic raw materials seems to have been in disfavor among fourteenth century gold-makers, and our early sources for the technology of alcohol are medical, concerned with the preservation of the body and the prolongation of life. The technologists of alcohol achieved an ever increasing degree of purity in their product through dehydration by chemical treatment and distillation, and through these procedures arrived at a conception of the nature of matter very similar to that attained by the gold-makers. Their relative success in attaining their objective, in comparison to the flat failure of their gold-making contemporaries in this respect, may have influenced certain alchemists to conclude that the true aim of that science was medicine rather than gold-making. In any case, as early as the middle fourteenth century we find an expression of the

[55] *Ibid.*, pp. 91-5, 96-8, 105-6, 111-13, 148-54, 144-5, 133-4, 158-60.

view that the fifth essence of wine, as the distillers of alcohol called their purest distillate, is just one example of a general category of fifth essences which can be obtained from all forms of matter by alchemical methods. Those who undertook the search for such fifth essences often betray their alchemical background in the materials they chose, which are those minerals in which the gold-makers had been most interested.

In the early sixteenth century we find working in the application of chemistry to medicine two distinct, although not mutually exclusive, groups, both of which subscribe to the theory that the efficacy of medicines resides in purer fractions separated out by distillation. Their distinction lies first of all in the adherence of one group, which I have called the herbal distillers, to the simple application of distillation to the materia medica of the herbalist (in which minerals were to some extent included), and the predilection of the other, here called the alchemical distillers, for the procedures and materials of gold-making alchemy. Beyond this however, we find that as the practice of distillation on various materials yielded a complicated array of essences, waters, oils and residues, the former group remained content with the simple theory of "separation of the impure from the pure," without concerning itself with the determination of which of its myriad distillates were most truly "pure," whereas the latter group shouldered the burden of working out a more elaborate theory for the more complicated science, through the establishment of a more or less consistent system of classification based upon supposed degrees of purity.

At the apex of this pyramid of distillation products we find the fifth essences, at its base the residues which were almost unanimously conceded to be unworthy of notice. The metals were made amenable to distillation by preparing them through acid dissolution, which had the consequence of relegating the synthetic salts thus prepared to the latter category, and of diverting them from the attention of the chemist. Here the glaring defect of this system of chemistry becomes apparent. In their preoccupation with theory the alchemical distillers, who were chiefly concerned with acids and minerals, remained impervious to the questions raised by these residues. It is, in fact, among the herbal distillers that we first find evidence of an awareness that all is not explained by the system of distillation chemistry. However, until their pragmatic attitude was combined with an interest in the nature of inorganic matter, the science of that aspect of nature remained in the phase which I have called distillation chemistry.

The strain which the development of inorganic chemical practice was putting on this system is evident in the late sixteenth century sources. The key to the resolution of the problem was found at the end of the century by Libavius, the first of the alchemical distillers to free himself from the prejudice against residues. This key was the adoption of the vaguest of the categories of distillation chemistry, *magisteria*, as the fundamental category of inorganic chemistry, and the transformation of that category, in fact if not in theory, into the most important in his system of chemistry.

NIKOLAI IVANOVICH PIROGOV — SURGEON, ANATOMIST, EDUCATOR

GEORGE HALPERIN

Nikolai Ivanovich Pirogov was born in Moscow on the 13th of November 1810, the thirteenth child in his family. His early education was obtained at home. At the age of twelve he was placed in a private school. Because of reverses in his father's fortunes he was taken out of school. Upon the advice of their family physician, Nikolai then decided to study medicine. Although he was not quite fourteen years old, he stated in his application that he was sixteen, the lowest age limit for entrance. He passed the examination and was admitted to the University of Moscow at the age of 14. The university was the seat of liberalism and opposition to the government. But Nikolai was too young to participate much in the liberal discussions. However, the effect of the student life upon him was significant. Here he became acquainted with the newer philosophic teachings of Schelling and of Hegel. He wrote years later in his "Diary of an Old Physician," "my world outlook changed rapidly, not so much because of the lectures I listened to, as because of the educational influence of the student milieu."

The pedagogic status of the university was low. Anatomy was given in lectures and there was no obligatory dissection. Pirogov never did any dissecting during his stay at the university and did not perform a single autopsy. "Surgery did not attract me in the least, and there was no instruction in operative surgery on cadavers."

The government adopted a project in 1827 of creating at Dorpat an institute for training graduates of Russian universities for professorial careers. The candidates had to be native Russians. Dorpat was the capital of Esthonia, one of the Baltic provinces of Russia a part of whose population was German or German-speaking. Pirogov passed his final examinations and received the degree of a doctor at the age of seventeen and one-half years. Because of his excellent scholastic standing he was selected as one of the candidates to be sent to Dorpat. "I arrived at Dorpat," he states in his Diary, "with a negligible amount of knowledge, with information derived principally from books and not from experiment or observation." At the institute, Pirogov occupied himself with anatomical studies. He performed experiments on ligation of arteries in dogs and cats. His first written dissertation dealt with ligation of the abdominal

aorta. The dissertation consisted of fifty pages written out in free-hand with illustrations made by him from his own preparations.

The faculty of the University of Dorpat consisted mainly of Germans. Among them was the well-known Professor Moyer, a gifted and accomplished surgeon. Moyer recognized in Pirogov a talented young man, and gave him considerable material support. Pirogov was given a room at the Surgical Clinic and the Professor spent many hours with young Pirogov in the dissecting room.

The original plan for the training of professors for the Russian faculties was to have them spend two years in Dorpat and then continue their studies abroad, principally in Germany. However, the stay in Dorpat was continued for five years because of the French revolution. The Russian government was afraid to send young men to Western Europe for fear they would be affected by revolutionary ideas.

In the spring of 1833 Pirogov was on his way to Berlin. The support given these students by the government was meager and the young Pirogov suffered many privations. "Medicine in Germany," according to Pirogov, "was at the cross roads." "This was the era of the Hegelian philosophy in all scientific disciplines, even in medicine." "The period of my life in Berlin," he writes in his Diary, "was the period of transition of German medicine to realism. It was the beginning of its triumphant entry into the realm of exact sciences. This was the time when there appeared Johannes Mueller in Berlin, the brothers Weber in Leipzig, Schönlein in Zurich, and Rokitansky in Vienna."

He returned in 1835, arriving first in the city of Riga, Latvia, cherishing the hope of being appointed to the chair of surgery in Moscow. He had spent two years in Berlin and Göttingen. Upon his arrival in Riga he fell sick and was placed in a hospital. In the meantime the chair of surgery at Moscow University was given to another candidate. He remained for a while in Riga, building up an extensive practice. He gave the doctors in Riga a systematic course in surgical anatomy, a subject which was entirely new for that time. From Riga he went to St. Petersburg, but on the way he stopped in Dorpat to visit his former teacher, Professor Moyer. Despite Pirogov's youth—he was only 26—Moyer informed him that since he himself was about to retire, he was going to propose him for the chair of surgery. In 1836 Pirogov was made professor.

Among the early accomplishments of the new professor was the publication of his "Annals," in the preface to which he stated that every physician ought to confess his errors. "Can I, a young man with limited experience,

be a genuine teacher of surgery? Of course not. I have therefore decided to make it a rule upon assuming the chair of surgery never to conceal from my students errors made by me, whether in diagnosis or in the treatment of a disease." The Annals were published in German, which was then the official scientific language, particularly in the medical world. "I consider it my sacred obligation," said Pirogov, "as a cautious teacher immediately to publicize my errors and their consequences so as to warn others against making the same mistakes." "My most ardent desire is that my pupils should treat me critically."

The students at the University of Dorpat met Pirogov with a certain prejudice, which was due to the fact that he was a Russian teaching in what was practically a German university. Pirogov spoke German poorly, and the students laughed at the errors he made. At the end of his first lecture, Pirogov addressed his students as follows: "Gentlemen, you, of course, realize that my German is bad and that that is why I cannot be as explicit as I would like to be. Therefore I would beg you to let me know after each lecture just where I was obscure so that I can repeat it once more." One of his students wrote many years later: "It was quite remarkable that a man who was met with distrust and almost hatred should become a few weeks later the most respected and loved of the professors." Pirogov's fame spread rapidly over Esthonia and the neighboring provinces. In addition to his pedagogic and clinical work, Pirogov visited with his assistants many cities and villages of the Baltic region performing numerous operations and autopsies, and giving private courses in surgery and anatomy.

Despite his great success as a teacher and practicing surgeon, he felt that he had to continue his studies, and so in 1838 we see him in Paris. When the 27 year old surgeon was introduced to the famous Velpeau, the latter eagerly asked him whether he knew the famous Pirogov. Upon finding that the visitor was Pirogov himself, Velpeau praised his tendencies in surgery. Pirogov spent five months in Paris, but did not find anything there particularly interesting.

In the course of the five years after his return to Dorpat, he labored from morning till late at night. He gave lectures on the theory and practice of clinical surgery and upon surgical and pathological anatomy. The status of medical science in Russia, at this time, was no higher than it was during Pirogov's student days in Moscow. Particularly sad was the state of affairs at St. Petersburg's Medico-Chirurgical Academy, which was conducted by the Ministry of Interior Affairs. Pirogov was rather anxious to be transferred to St. Petersburg. However, he felt that it

would be necessary to have a surgical clinic and so he proposed to the government authorities a project for the establishment of a hospital clinic in connection with the academic chair of surgery. Despite the opposition of the die-hards, this was accepted and Pirogov was invited to the chair of surgery in the academy in 1840.

Here is what Pirogov wrote in his memoirs. " From the earliest years of my life science constituted my ideal. Truth, which is at the basis of science, became my highest aim, toward the accomplishment of which I have always striven. Science has rased me above the masses; science has taught me to love truth; and science has contributed to the development in me of the sacred idea of duty and obligation. Nothing can cleanse the soul of emptiness like science."

Upon his assumption of the chair of surgery in St. Petersburg at the age of 30, Pirogov made it his aim " to assist in raising the medical art in our country to a level equal to that of the educated countries of Europe." Pirogov was not satisfied with the clinical material of a large hospital. He also worked in other hospitals and clinics as surgeon and consultant. He gave private courses to physicians and received patients at home. As the fame of Pirogov grew, the number of his enemies among the old-fashioned professors at the Academy likewise grew. All they could see in the young and energetic scientist was a rival in private practice, who was particularly dangerous because he never demanded money from the sick but accepted whatever they gave him. He was democratic, easily accessible, and disdainful of the glamor which went with the professorship of that era.

In 1842 Pirogov had married. His wife gave birth to a son. Nicholas, one year later, and two years later to another son. Following this second labor, she became ill with meningitis and died. Shortly after this tragedy, Pirogov made a trip abroad visiting Italy, France, and Germany. In 1847 he made a trip to the Caucasus and introduced a number of important innovations in military surgery. During that campaign he was the first in Europe to use etherization. Upon his return from the Caucasus to St. Petersburg, he worked twenty hours a day in the anatomical institute and in laboratories amid conditions which were harmful to his health. As a result of this type of life, his health suffered a great deal and he became dangerously ill.

During the campaign at Sevastopol in the Crimean war, the grand duchess Elena Pavlovna summoned Pirogov and urged him to accept the position of Surgeon General. The two had conceived an idea that was entirely novel in Europe—the idea of sending female nurses to serve the

wounded and sick soldiers. The grand duchess, through her personal influence with Nicholas I, secured the realization of this plan and the appointment of Pirogov as its head. The courtiers, who owned thousands of serfs, but cared very little about the fate of soldiers sent to war, attempted to discredit the idea. The great wit, the Prince Menshikov, said that the presence of women in military hospitals would create a need for the establishment of venereal departments. Pirogov believed in the idea and the society created by him served as the prototype for the creation of the Red Cross in Russia.

To the battlefront of Crimea Pirogov brought his enormous clinical experience, his skill, and his extraordinary energy. Amid conditions that were terribly unhygienic, Pirogov and his assistants performed daily several hundreds of operations. He visited various hospitals and barracks of Crimea and Novorossiya, studying the conditions and always attempting to weed out cheating and stealing. He sent extensive reports to St. Petersburg informing his friends and influential people of the terrible disorders in the Army. Pirogov himself, all of his female nurses, and all of his physicians were sick at one time or another with spotted typhus. Many of them had died. Pirogov's own life was often in danger. He had remarried and in one of his letters to his second wife, he wrote: "To describe what we found in this hospital is impossible. The Slav indifference, medical ignorance, and Tartar filth are combined in fabulous dimensions in these barracks containing the sick. The patients lie on boards one next to the other without any differentiation, those with unclean, festering wounds, near those with clean wounds. The government prepared neither linen for the wounded nor transport, and when suddenly in addition to those already here, 6,000 new ones were brought, no one knew where to begin. Not only in Sevastopol but also in the entire Crimea one found the same picture. From Sevastopol to the first station, a distance of sixteen miles, you will see fallen horses rotting in the mud with eagles and vultures flying over them. In open wagons, without coats, the sick were driven for about seven days in the open field. The only redeeming features were the sacrifices of the nurses and of the young physicians."

Upon his return to St. Petersburg, the emperor met Pirogov in the palace of the young empress. Pirogov was telling her the truth of the situation, but the emperor would not believe it, and, having lost his temper, said that it could not be true. Pirogov answered, "Yes, emperor, it is true because I have seen it." Writing from Crimea to his wife,

Pirogov said: "I decided to live without undressing; I do not remove my clothes either by day or by night; that is much more convenient. If ever I am captured by the enemy I will be captured in toto."

The popularity of Pirogov, his bold and persistent struggle against the old regime placed him in the front ranks of social leaders attempting to reform the Russian government. His name was suggested for the Ministry of Education. In a popular essay entitled "Life's Problems," Pirogov expressed his views on education. The essay proved to be a sensation and was translated into several languages. In 1856, disgusted with the intrigues in the Military Academy, Pirogov decided to hand in his resignation. The time was the beginning of the birth of liberalism in the government. It was the beginning of the epoch of great reforms.

Pirogov was appointed head of the system of education in the South. He plunged into this new activity with his usual energy. He visited the obscure towns and villages, not infrequently sleeping on the floor, and discussed with the local teachers their educational problems. In his administrative pedagogic activity, Pirogov passionately insisted on the right of every nationality to its national determination and the maintenance of its national peculiarities. "I can truthfully say," stated Pirogov, "that it is my very strong feeling that in the sacred business of science and of truth I have never made any distinction between Russian, Polish, German, or Jewish students. I always believed that at the university scientific trends should be stronger than the national. As a physician, I paid particular attention to the varying individuality of the pupils. I insisted that the teachers pay attention to the individuality of a student, his tendencies and his faults."

In Kiev and in Odessa Pirogov was active in the development of a free press. After five years of pedagogic activity, he wanted to retire. He was permitted by the government in 1861 to do so. At the banquet tendered to him by the professors of the University of Kiev, Pirogov stated: "Here on earth there is one incontrovertible truth, and that is, to serve an idea. He who has not forgotten his own youth and who has studied the youth of others cannot fail to detect in it the striving for noble ideas; he cannot fail to discover in it manifestations of that grave battle which the spirit of men must wage in the path to truth and to perfection."

Having retired from his position as Inspector of Education of Southern Russia, Pirogov bought an estate. He had accepted the post of one responsible for choosing candidates for pedagogic positions to be sent to Germany and to France. In connection with this duty, Pirogov spent four years in Heidelberg and in Berlin, visiting all the university cities where

there were Russian candidates. While in Heidelberg, he was requested to visit the wounded Garibaldi. During the same period, Pirogov published, both in Russian and in German, two independent works on the same theme, namely, his classical two-volume work entitled " Introduction to General Military Surgery." In 1866 he returned to Russia and was requested by the government to inspect all of the universities, in particular their medical faculties. However, the attempted assassination of Alexander II resulted in a change in politics. Pirogov was asked to hand in his resignation.

The scientific literary activity of Pirogov began with his dissertation on ligation of the aorta. The dissertation was written in Latin and was translated into Russian and German. The next contribution was that on the anatomico-pathological description of inguinal hernia. Then there appeared the famous " Annals," in which Pirogov published his errors. Under his direction, the new surgical clinic at St. Petersburg achieved a great reputation. The fame of Pirogov reached all of Europe. His remarkable surgical technique was based on enormous material.

His most important contribution was his Atlas of Topographical Anatomy. He conceived the idea of making cross-sections of frozen human bodies. He did that with the aid of a chisel and hammer. He was able to obtain, as he put it, " magnificent preparations, very instructive for physicians. The positions of many organs (heart, stomach, bowel) appeared entirely different from the way they appeared at postmortems at which the atmospheric pressure and loss of continuity of hermetically sealed cavities changed their positions." One of his biographers, Professor Razumovsky, said: " This genius utilized our northern frost for the benefit of humanity. This particular labor immortalized the name of Pirogov and demonstrated that Russian scientific medicine deserves the high esteem of the entire educated world. If Pirogov had done nothing else, his name would still remain immortalized."

One of Pirogov's best known contributions is the famous osteoplastic operation for amputation of the foot. Pirogov was also one of the first advocates of the great importance of hygiene. In his " Principles of the General Military Field Surgery," he said: " The reader will not fail to become convinced that I believe in hygiene. This will be the basis of the progress of our science. The future belongs to preventive medicine."

From 1879 to his death Pirogov wrote his autobiography, " The Diary of an Old Physician." In the village of " Vishnya " Pirogov lived for fifteen years, practicing and managing his estate.

With regard to fees, Pirogov expressed the following opinion: " Every

one of us should from time to time re-examine himself as to how and to what extent one is proceeding toward the inaccessible goal of the elevated and the sacred. I have made it a rule never to demand anything from my patients, no matter how rich they were. I accept that which is given to me with the idea that I am not being paid for my labor but for my time. I valued my calling and my skill too highly to see in it a means of acquiring wealth."

In 1881, Pirogov was found to have a growth in his mouth. According to Professor Sklifasovskiy the growth did not leave the slightest doubt as to its nature; it was a malignancy. At a consultation with a number of Moscow professors, it was concluded that an immediate operation was indicated. However, it was decided to consult with Theodor Billroth of Vienna. After examining the patient, Billroth stated in a calm voice that the disease was not serious and that it would pass without any surgical intervention. Hearing this, Pirogov said to him: "When you say it, then I am satisfied." He returned to his estate and continued to work in his garden, to manage his farm, and to write his diary. He died that same year, on the 23rd of November 1881. On that day, he wrote down his own diagnosis underlining the error made by Billroth. After the death of Pirogov, Billroth stated in the press that of course he knew that the growth was malignant, but that he felt that a sick man, seventy years old, with definite signs of cachexia, would not withstand an operation. "Besides," said Billroth, "there would be a recurrence anyhow. I would not criticize any surgeon who would attempt to operate, but so far as I was concerned, I felt that I could not achieve a good result. For that reason, I decided to encourage the sick man and to send him home."

Pirogov was one of the first in Europe to use ether. In 1847 he wrote a small manual on etherization. The others who used ether in Europe were Syme in Edinburgh and Robert Liston. Sir James Young Simpson used it in midwifery.

With Fielding H. Garrison who refered to Pirogov as Russia's greatest surgeon, and one of the great surgeons of all time, comparing his remarkable career of self-development to that of Paré and of Hunter, we may sum up: He is noted 1) for his complete osteoplastic amputation of foot (1854); 2) for his great atlas of 224 plates in which frozen sections were first utilized on a grand scale in anatomic illustrations (Anatomia topographica sectionibus per corpus humanum congelatum triplice directione ductis illustrata, St. Petersburg, 1851-1854); and 3) for his Treatise on Military Surgery, in which he holds large hospitals responsible for the spread of epidemic diseases and recommends small,

barrack-like pavillions, such as were suggested by his Crimean experiences. In speed, dexterity, and strength of hand he was great.

"In relation to his country," said Garrison, "we may apply to him the exquisite tribute which Henry James paid to Tourgenev. 'His large nature was filled with the love of justice but he was also of the stuff of which glories are made.'"

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AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE

REPORT OF THE

TWENTY-NINTH ANNUAL MEETING

DURHAM, NORTH CAROLINA

19, 20, AND 21 APRIL 1956

THE PROGRAM

THURSDAY, 19 APRIL

Morning

9:00- 5:00 Registration, Washington Duke Hotel (Friday and Saturday at the Dean's Office, Duke Medical School)

10:00-12:00 Executive Committee Meeting, Washington Duke Hotel

10:00-12:00 Tour of Duke University Campus and Library

Afternoon

1:00 Luncheon—Morehead Planetarium, Chapel Hill—Guest of the University of North Carolina

2:30 Clinic Auditorium, University of North Carolina School of Medicine

Symposium on the History of Medicine in the South

Wiley D. Forbus, Presiding

1. Medicine among the American Indians in the South.
   Warner Wells, Chapel Hill, North Carolina
2. Sectional Conflict and Medical Education in Louisiana
   John Duffy, New Orleans, Louisiana
3. Josiah C. Nott, Southern Physician
   George J. D'Angelo, Durham, North Carolina

Intermission—Coffee in the Division of Health Affairs Library where Anatomical Exhibit is on display.

4:30-5:00 Medieval Illuminated Medical Manuscripts
Loren C. MacKinney, Chapel Hill, North Carolina

Evening

6:30 Cocktails—Guest of Dr. and Mrs. Wilburt C. Davison

8:00 Barbecue at Turnage's—Guest of Duke University

BENJAMIN SPECTOR, M. D.

President of the American Association of the History of Medicine, 1956-1958.

FRIDAY, 20 APRIL

Morning

9:00 General Session—Men's Graduate Center, Duke University
Nathan Womack, Presiding

1. Pioneers of Virology
   Morris C. Leikind, Washington, D. C.
2. A Note on Medicine in the Spain of Don Quixote (Read by Title)
   Felix Marti-Ibañez, New York, New York.
3. Deborah Sampson, Alias Robert Shurtleiff, Fighting Female of the Continental Line
   W. F. Norwood, Los Angeles, California
4. Medical Education in 19th Century France
   Erwin H. Ackerknecht, Madison, Wisconsin
5. Dramatic Presentations by Mental Patients in the Middle of the Nineteenth Century and A. Dumas' Description
   George Mora, Chapel Hill, North Carolina
6. Charles E. Morgan and His *Electro-physiology and Therapeutics*
   Paul F. Cranefield, Brooklyn, New York

11:00-12:15 Council and Business Meeting

Afternoon

12:30 Luncheon—Guest of Dr. and Mrs. James H. Semans

2:00 Duke Hospital Library

Symposium on the History of Epidemiology
George Rosen, Presiding

1. American Epidemiology before the Civil War
   Wilson G. Smillie, New York, New York
2. Benjamin Rush, John Mitchell and Yellow Fever
   Saul Jarcho, New York, New York
3. A Historical Approach to Epidemic Mental Disorders
   Ernest M. Gruenberg, New York, New York

Intermission

4:30 Dedication of the Josiah C. Trent Collection of Books on the History of Medicine
John F. Fulton, New Haven, Connecticut

Evening

7:00 Annual Dinner—Hope Valley Country Club (Informal)
Benjamin Spector, Presiding

The Garrison Lecture: Medicine and the Historian
F. N. L. Poynter, London, England

SATURDAY, 21 APRIL

Morning

9:00 General Session—Men's Graduate Center, Duke University
John B. Blake, Presiding

1. Calvin Jones. Some of His Contributions to Medical Practice in North Carolina and Tennessee
   S. R. Bruesch, Memphis, Tennessee
2. Ezra Mundy Hunt, 1830-1894, Pioneer in Public Health
   Fred Rogers, Philadelphia, Pennsylvania
3. Benjamin Franklin and the Rise of Free Treatment of the Poor by the Medical Profession of Philadelphia
   Robert J. Hunter, Philadelphia, Pennsylvania
4. Jefferson on the Medical Theory and Practice of His Day
   Courtney R. Hall, New York, New York
5. The Nature of Medical Error
   Frederic D. Zeman, New York, New York
6. The Famous Harrison Case and Its Repercussions
   Linden F. Edwards, Columbus, Ohio

12:00 Luncheon—Guest of Duke University

Committee on Program and Local Arrangements

GEORGE ROSEN, *Program Chairman*
GEORGE J. D'ANGELO, *Local Arrangements Chairman*
WILBURT C. DAVISON
MARY TRENT SEMANS
WARNER WELLS
LOREN C. MACKINNEY

COUNCIL MEETING

The Vice-President, Dr. Benjamin Spector, called the Council Meeting to order at 11:45 a.m. on Friday, 20 April 1956, in the Men's Graduate Center, Duke University.

The Vice-President read the following telegrams:

Please tell Members American Association of the History of Medicine I am prevented from attending meeting by what I must accept as a prior responsibility. Deeply regret conflict of dates and know I am missing an interesting session but am happy that the affairs of the Association are in your capable hands.

George W. Corner

As every year I am with you in spirit. Warm greetings particularly to Mary Semans, Davison, MacKinney.

Sigerist

We deeply regret our inability to be with you in person. We know from the program you are having a wonderful time. All our very best wishes to you and all our friends at the meeting.

Dr. and Mrs. Emerson Crosby Kelly

I. REPORT OF THE EXECUTIVE COMMITTEE

The following report of the Executive Committee was read by the Secretary-Treasurer:

The meeting of the Executive Committee was called to order at 10:00 a. m., April 19, in the Washington Duke Hotel, by the Vice-President, Benjamin Spector. Other members present were John B. Blake, Lloyd G. Stevenson, Henry R. Viets, and Leo M. Zimmerman.

The Executive Committee strongly urge upon the members of the Association the importance of increasing the membership. In particular, members are urged to point out to their friends and colleagues who are interested in medical history the advantages of membership, including especially the subscription to the *Bulletin of the History of Medicine*. Members of the Association who are also members of Constituent Societies are especially urged to bring to the attention of the members of these societies the opportunities afforded by joining this Association. It was suggested that many persons might like to join if they knew more about the Association, and that it welcomes all those with a sincere interest in medical history.

In view of the fact that a number of members of this Association have in the past received the *Bulletin* for a year or more without paying dues up to date; and that under the Constitution membership may be forfeited only by a vote of two-thirds of the members of the Council present at the Annual Meeting; the Executive Committee unanimously recommend to the Council the passage of the following Amendment to the By-Laws:

"*Article 15.* Members whose dues for any calendar year remain unpaid by July 1 of that year shall no longer receive the publications of the Association."

The Executive Committee recommend to the Council that the Committee on Bibliography of the History of Medicine in the United States and Canada, and the Committee to Survey the Teaching of the History of Medicine in American and Canadian Medical Schools be designated as Standing Committees of the Association.

Having received particularly attractive offers of sponsorship and support from the Medical College of Virginia and the Section on the History of Medicine of the Richmond Academy of Medicine, the Executive Committee have voted to hold the next annual meeting in Richmond on May 6, 7, and 8, 1957.

The Executive Committee recommend to the Council that a copy of the Welch Medal be presented to Mr. Joseph Fabian Ford, donor of the fund that established the medal, inscribed with his name, the word "Donor," and the date of the establishment of the fund.

The Secretary-Treasurer reported on the current financial status of the Association, pointing out that it has no accumulations of funds from the past, and that its current income is at best barely sufficient to pay current expenses. To avoid the necessity of raising the general dues the Executive Committee unanimously recommend to the Council that dues for Active Membership in the Association for next year and until further action of the Council be:

For Members	$ 6.00
For Contributing Members	10.00
For Sustaining Members	25.00

In order to sustain the Association this year voluntary contributions from the members or others will be welcomed.

Upon motion duly made and seconded the Council unanimously approved the report as read.

The Council then proceeded to take up the measures recommended by the Executive Committee. Upon motion duly made and seconded, the Council unanimously voted to amend the By-Laws by adding the following article:

Article 15. Members whose dues for any calendar year remain unpaid by July 1 of that year shall no longer receive the publications of the Association.

Upon motion duly made and seconded, the Council designated the Committee on Bibliography of the History of Medicine in the United States and Canada, and the Committee to Survey the Teaching of the History of Medicine in American and Canadian Medical Schools, Standing Committees of the Association.

Upon motion duly made and seconded, the Secretary-Treasurer was directed to present a copy of the Welch Medal to Mr. Joseph Fabian Ford, inscribed with his name, the word " Donor," and the date of the establishment of the fund.

After some discussion, in which it was pointed out that " Contributing Members " and " Sustaining Members " would be Active Members under the Constitution with no rights other than those pertaining to all Active Members, and that any amount paid over and above the regular dues would be considered solely as a voluntary contribution to the Association, the Council, upon motion duly made and seconded, voted with one abstention that dues for next year and until further action of the Council for Active Members of the Association be:

for Members	$ 6.00
for Contributing Members	10.00
for Sustaining Members	25.00

II. REPORT OF THE SECRETARY-TREASURER

On January 4, 1956, the Secretary-Treasurer was notified by the President of the Association that the Executive Committee had appointed him to this office *ad interim*, following the resignation of Dr. Ilza Veith. In due course Dr. Veith turned over her records, and Dr. Emerson Crosby Kelly, the former Treasurer, turned over his membership file and certain other financial records. Since then the Secretary-Treasurer has sent out bills for annual dues to the members; processed fourteen applications for membership; forwarded to the members, through the courtesy of the Committee on Local Arrangements for this meeting, the list of candidates for officers proposed by the Nominating Committee; and conducted other correspondence in connection with the duties of the office.

The Secretary-Treasurer has also compiled a list of the membership of the Association for publication in the May-June issue of the *Bulletin of the History of Medicine*. As of April 13 the membership was as follows:

Honorary Members	8
Constituent Societies	24
Active Members	487
Non-resident Members	15

I regret to report that this represents a decrease in every category of membership during the past year. Since May 1, 1955, the Association has had a net loss of 1 Honorary Member, the late Dr. George Sarton; 1 Constituent Society; 2 Non-resident Members; and 34 Active Members.

The following accounts are also submitted:

RECEIPTS: January 4-April 13, 1956

Balance on hand, January 4, 1956	$ 0.00
Dues from Members	2,803.26
Loan	100.00
	$2,903.26

EXPENDITURES: January 4-April 13

Printing, stationery, postage		$ 51.90
Secretary-Treasurer miscellaneous expenses		5.19
Dr. Ilza Veith, expenses as Secretary-Treasurer		111.70
Johns Hopkins Press		
1 1955 Subscription	$ 5.00	
Reprints, Bibliography	17.64	
		22.64
Osler Contest, Expenses		22.00
Committee on Bibliography, expenses		4.25
		$ 217.68
Balance on hand, April 13, 1956		2,685.58
		$2,903.26

Lest the size of this balance deceive anyone, it should be pointed out that it is only $15.58 more than the bill for 1956 subscriptions which has just been received from the Johns Hopkins Press.

The following report from Dr. Kelly was received yesterday:

Hoyt Austin
Public Accountant
452 Broadway
Albany 7, N. Y.
April 17, 1956

Dr. George W. Corner, President
American Association of the History of Medicine

Dear Doctor Corner:

I have examined the books and records of the American Association of the History of Medicine, c/o Dr. Emerson Crosby Kelly, Treasurer, for the period April 25, 1954 to March 31, 1956, and find the same to be true and correct.

Very truly yours,
/s/ Hoyt Austin
/s/ Frank A. Ramsay
HOYT AUSTIN

HA:jm

31 March 1956

BALANCE at audit April 25, 1954	$3,076.14	
RECEIPTS: Members	3,552.50	
New Haven Meeting	557.76	
Medallic Art Company	10.09	(Refund)
Dr. Tallmadge	5.00	(Donation)
Detroit Meeting	718.48	
TOTAL	$7,919.97	
EXPENSES:		
Refunds: Drs. Bick and Nettleship	$ 8.00	
Expense: New Haven Meeting	774.53	
Osler and Welch Medals	150.88	
Garrison Lectures: Dr. Esmond R. Long	100.00	
S. N. Kramer, Ph. D.	100.00	
Expenses: Detroit Meeting	866.95	
Secretary—Dr. Radbill	163.59	
Treasurer—Dr. Kelly	31.08	
Paid to the Johns Hopkins Press	5,722.89	
TOTAL	$7,917.92	
BALANCE ON HAND March 31, 1956		$2.05

Respectfully submitted,
/s/ Emerson Crosby Kelly
EMERSON CROSBY KELLY, M. D.

This balance has been transmitted by Dr. Kelly to the present Secretary-Treasurer.

In conclusion, I should like to express my thanks to the officers of the Association for their courteous and helpful co-operation and advice.

Respectfully submitted,

JOHN B. BLAKE, *Secretary-Treasurer*

Upon motion duly made and seconded, the Council unanimously approved the report of the Secretary-Treasurer.

The Vice-President appointed an Auditing Committee from the floor to report at the Business Meeting.

III. REPORT OF THE DELEGATE TO THE INTERNATIONAL SOCIETY

Dr. Richard H. Shryock reported that the next International Congress of the History of Medicine would be held in Madrid and Salamanca in the second half of September, 1956.

Dr. Owsei Temkin informed the Council that he had had a personal communication from Dr. F. A. Sondervorst, Secretary-General of the International Society of the History of Medicine, from which he gave some additional details.*

* For latest information see this *Bulletin*, May-June 1956, p. 277.—ED.

IV. ELECTION OF NEW CONSTITUENT SOCIETIES

Upon motion duly made and seconded, the Council unanimously elected as Constituent Societies, (1) Tufts University Medical and Dental Library, of Boston, Massachusetts, and (2) American Academy of the History of Dentistry, of Philadelphia, Pennsylvania.

V. REPORTS OF COMMITTEES

Editorial Committee

Dr. Lloyd G. Stevenson, chairman, reported that the Editorial Committee had made a selection of the papers read at the Detroit meeting of the Association for recommendation to the Editor of the *Bulletin of the History of Medicine*; that the Committee had edited the transactions of the meeting as prepared by the Secretary; and that the Committee had gathered abstracts of all the papers, which had just been published in the *Bulletin*.

Dr. Stevenson wished to remind speakers that the Committee desired abstracts, and that they should not be longer than one double-spaced typewritten page. He also pointed out that the submission of abstracts did not necessarily end the speakers' obligations to the Association, since the Editorial Committee also hoped to make a selection of the papers presented at the meeting to be recommended to the Editor of the *Bulletin*.

Upon motion duly made and seconded, the Council accepted the report of the Editorial Committee.

Welch Medal Committee

The following report of the Welch Medal Committee was read:

The Welch Medal Committee, having surveyed the noteworthy contributions which have been published in the field of the history of medicine during the last five years, proposes that the medal be awarded to Lyman H. Butterfield for his monumental edition of the letters of Benjamin Rush. This work, by its precision, insight, and importance not only exemplifies the scholarly standards to which the American Association of the History of Medicine is dedicated but also constitutes a meritorious contribution both to the history of medicine and to the history of the United States.

William F. Norwood
Benjamin Spector
Saul Jarcho, *Chairman*

Upon motion duly made and seconded, the Council accepted the report of the Welch Medal Committee.

Osler Medal Committee

The following report of the Osler Medal Committee was read:

The William Osler Medal Committee, having examined ten essays from nine schools, proposes unanimously that the Medal be awarded to Edward D. Coppola, Yale University School of Medicine, for his essay "The Discovery of the Pulmonary Circulation: A New Approach." The Committee also recommends for

honorable mention the essays of Kenneth E. Stanley, Jr., University of Kansas Medical School on "The Sedimentation Rate" and of Donald Newman, U. C. L. A. Medical School on "Vaccination before the Court."

ERWIN H. ACKERKNECHT, *Chairman*
WILBURT C. DAVISON
LLOYD G. STEVENSON

Upon motion duly made and seconded, the Council accepted the report of the Osler Medal Committee.

Committee on Local Arrangements

No report was received from the Committee on Local Arrangements.

Upon motion duly made and seconded, the Council voted to express warm thanks to Dr. George J. D'Angelo for the excellence of the local arrangements.

Committee on Program and Papers

The activities of this Committee need no elaborate report, since the program has spoken for itself. Favorable comments concerning the papers presented indicate that the general level was high. The task of preparing a program was made more pleasant by the excellent cooperation provided by Dr. George D'Angelo, Chairman of the Committee on Local Arrangements, and by Dr. John B. Blake, Secretary-Treasurer of the Association.

GEORGE ROSEN, *Chairman*

Committee on Research in American Medical History

Dr. Richard H. Shryock, chairman, reported that the Committee had begun an analysis of the material in the annual bibliographies of the Association, in an effort to determine what areas of American medical history were being neglected. He hoped that the Committee might have more to report at the end of another year.

Upon motion duly made and seconded, the Council voted to extend the Committee for another year.

Committee on Bibliography of the History of Medicine in the United States and Canada

Dr. Genevieve Miller, chairman, reported that the Bibliography for 1954 had been published in the September-October 1955 issue of the *Bulletin of the History of Medicine*, and that the format had been changed to double columns and the form of citation to conform to standard practice in medical papers. Dr. Miller expressed her thanks to the members of the Committee for their invaluable co-operation over the years, and pointed out that reprints were available gratis to those who were interested.

In response to a question from the floor about the distribution of the reprints, Dr. Miller stated that ten copies were sent to each member of the Committee and that additional copies were sent to certain librarians who assisted the Committee.

Dr. Viets reported to the members of the Council that he had made a practice of distributing some of his copies to general historians and historical societies in

Boston. He mentioned in particular Professor Samuel E. Morison of Harvard, the Boston Athenaeum, and the Massachusetts Historical Society. He believed that this superb Bibliography, which was of great value to general historians, was too little known and deserved wider distribution and recognition.

Committee to Survey the Teaching of the History of Medicine in American and Canadian Medical Schools

Dr. David A. Tucker, Jr., chairman, presented the following report for publication in the transactions of the Association:

Review of Courses in the History of Medicine

Medical College of Alabama

No course listed as formerly under "Medical Library."

University of Arkansas School of Medicine

No essential change.

Bowman Gray School of Medicine

No essential change.

University of Buffalo School of Medicine

Freshman Year: First trimester, films describing major events and individuals in History of Medicine.

Sophomore Year: Second trimester, 11 one-hour lectures.

Junior Year: Monthly seminars held Sunday evenings for the discussion of classical medical writings.

Senior Year: Monthly Sunday evening seminars similar to Junior program but somewhat more advanced.

Dept. of History of Medicine. Elective basis. Dr. Wolfson and Associates.

University of California School of Medicine

No essential change.

Chicago Medical School

No essential change.

University of Chicago School of Medicine

No essential change.

University of Cincinnati College of Medicine

No essential change.

University of Colorado School of Medicine

No essential change.

Creighton School of Medicine

No essential change.

Duke University School of Medicine

The J. C. Trent Medical History Society, open to all Duke medical students and house officers, meets the second Tuesday of each month for informal discussions or a guest lecture. The Society also sponsors the J. C. Trent Memorial Lecture, established by Mrs. Mary Trent Semans.

George Washington University School of Medicine

No essential change.

Medical College of Georgia

No essential change.

Hahnemann Medical College

Same as Jefferson Medical College.

Howard University College of Medicine

No essential change.

University of Illinois College of Medicine

No essential change.

State University of Iowa College of Medicine

No essential change.

Jefferson Medical College of Philadelphia

No essential change.

Johns Hopkins University School of Medicine

No essential change.

University of Kansas School of Medicine

Acting chairman of the Department: Edward H. Hashinger, University of Kansas Medical Center. Professor Emeritus: Ralph H. Major.

Second year: General survey of the History of Medicine. 10 hours lecture.

Third year: *History of Medicine*. This course covers the development of the various specialties in medicine, the introduction of various methods of diagnosis

and treatment, and the history of some of the important diseases. Forty hours lecture.

Fourth year: *History of Medicine.* These lectures present the work of individual physicians, the development of certain phases of medicine and medical practice, and the study of some of the great books in medicine. Eleven hours lecture.

University of Louisville School of Medicine

No essential change.

Stritch School of Medicine of Loyola University

No essential change.

Marquette University School of Medicine

No essential change.

University of Maryland School of Medicine

No essential change.

College of Medical Evangelists School of Medicine

No essential change.

Meharry Medical College

No essential change.

University of Michigan Medical School

No essential change.

Ohio State University College of Medicine

No essential change.

University of Pennsylania School of Medicine

No essential change.

University of Pittsburgh School of Medicine

No essential change.

State University of New York College of Medicine at New York City

No essential change from report of last year.

State University of New York College of Medicine at Syracuse

No essential change from report of last year.

Temple University School of Medicine

No essential change.

University of Texas School of Medicine

No essential change.

Tufts University School of Medicine

No essential change.

University of Utah College of Medicine

No essential change.

Medical College of Virginia

No essential change.

University of Washington School of Medicine

401. Introduction to Medicine: Survey of the objectives of medicine with an introduction to the historical background of medical ethics and economics. Medical historical material illustrates the reflection of social and economic readjustments in medical progress.

Required for first-year medical students. Haviland, Staff. (Listed under "Medical Practice and Problems.")

Western Reserve University School of Medicine

No essential change from report of last year.

West Virginia University School of Medicine

No essential change.

University of Wisconsin Medical School

No essential change.

Woman's Medical College of Pennsylvania

No essential change.

Yale University School of Medicine

No essential change.

CANADIAN SCHOOLS

University of Alberta Medical Faculty

No essential change.

University of British Columbia Faculty of Medicine

No essential change.

Dalhousie University Faculty of Medicine

No essential change.

Laval University

No essential change.

McGill University Faculty of Medicine

No essential change from report of last year.

University of Montreal Faculty of Medicine

No essential change.

University of Ottawa Faculty of Medicine

No essential change.

University of Saskatchewan College of Medicine

No essential change.

University of Toronto Faculty of Medicine

No essential change.

University of Western Ontario Faculty of Medicine

No essential change.

Compiled from current American and Canadian Medical School catalogues.

DAVID A. TUCKER, JR., *Chairman*

Committee on 75th Birthday Tribute to Dr. E. B. Krumbhaar

The Secretary-Treasurer read the following report.

In accordance with Dr. Krumbhaar's wish, the committee propose, with some regret, that the Association's official tribute to him, at the 1957 Annual Meeting, be confined to a single address, to which he has indicated that he would be willing to make a response. While the address may be expected to concern itself primarily with Dr. Krumbhaar's contributions to the Association and to the field of medical historiography, it is hoped that it may also touch upon his contributions to various other disciplines.

JOHN F. FULTON
SAMUEL X. RADBILL
RICHARD H. SHRYOCK
OWSEI TEMKIN
HENRY R. VIETS
W. B. MCDANIEL, 2D, *Chairman*

12 April 1956

VI. REPORTS OF CONSTITUENT SOCIETIES

Alabama Society of Medical History

Officers and Program of the Alabama Society of Medical History for the year 1955-56:

Officers:	President:	Dr. Buford Word
	Vice-President:	Dr. Ben C. Moffett
	Secretary-Treasurer:	Miss Virginia Baxley

Program: Four meetings were held during the school year:

1. November 2, 1955, Speaker: Mr. Glenn D. Sockwell, Senior Class, 1956, Medical College, University of Alabama.
   Subject: Man's Conquest of Pain.
2. December 7, 1955, Speaker: Dr. Wood S. Herren, Assistant Professor of Clinical Medicine, Medical College, University of Alabama.
   Subject: Superstition, Seaweed and Surgery.
3. Speaker: Dr. Albert E. Casey, Professor of Pathology, Medical College, University of Alabama.
   Subject: The History of Tissue Transplantation.
4. Speaker: Mr. Lawrence K. Levin, Senior Class, 1956, School of Dentistry, University of Alabama.
   Subject: Emile Magitot, Father of Experimental Dentistry.

B. C. MOFFETT, *Vice-President*

Beaumont Medical Club

The officers of the Club for this year have been: Dr. Max Taffel, New Haven, President; Dr. T. R. Forbes, New Haven, Vice-President; Dr. L. L. Waters, New Haven, Secretary-Treasurer; Dr. John F. Fulton, Delegate to the American Association of the History of Medicine.

One meeting of the Beaumont Medical Club has been held during the current academic year. This consisted of a pilgrimage to Lebanon, Connecticut, the birthplace of William Beaumont. This was the one hundredth meeting of the Beaumont Medical Club. In the old meeting house at Lebanon, Dr. J. F. Fulton presented the paper of the day entitled "Gastric Physiology before Beaumont." The spring meeting of the Club will be held on April 27th in New Haven. Dr. John P. Riesman of New Haven will speak on "Medical Progress in Northern Newfoundland and Labrador. The Grenfell Mission Today." Dr. Robert H. Parry, formerly Medical Officer of Health, Bristol, England, will speak on "Changing Concepts."

L. L. WATERS, M. D., *Secretary-Treasurer*

Boston Medical History Club

Dr. Viets reported that the Club now meets only on special occasions.

Calgary Associate Clinic Medical History Society

The Historical Group of the Clinic is now completing its twenty-fourth year of activity, while the *Historical Bulletin*, which publishes the papers presented, begins its twenty-first year of publication in May, 1956.

During the past year the following papers have been presented:

Dr. G. B. Elliott: "The History of Tissue Staining."

Mr. Kenneth Sturdy, of the Institute of Technology and Art, Calgary: "Artist's View of the Human Figure."

Miss B. Donaldson, R.N.: "Dr. G. H. Manchester of New Westminster."

Dr. J. B. Aiken: "Jewish Contributions to Medicine."

Mrs. M. Duthie, R.N.: "Unsung Heroines" (Missionary Nurses from Alberta Nursing Schools).

Dr. G. O. Prieur: "François Gendron of Huronia."

Dr. G. E. Learmonth: "Memorabilia."

The attendance averages thirty to forty, and the question period following each presentation attests the interest aroused. Each season it is the custom to have a senior physician of the community present his "Memoirs" and later his photograph is added to a photographic gallery commemorating early pioneers of the West. It is also the custom to obtain a photograph of outstanding figures in international medicine who have been the subject of papers presented at these meetings, and the gallery is fast outgrowing the original space allotted to it.

E. P. SCARLETT, M. B., *Delegate*

College of Physicians of Philadelphia, Section on Medical History

The Section on Medical History of the College of Physicians of Philadelphia has presented a varied program during the past year. The President of the College, Dr. Lewis C. Scheffey, appointed the following Fellows to serve on the Executive Committee of the Section, which now has 146 members: Drs. Maurice S. Jacobs, Herbert T. Kelly, Samuel X. Radbill, the Chairman, Nicholas Padis, and the Clerk, Fred B. Rogers, *ex officio*. Dr. Robert J. Hunter was appointed to represent the Section at the Annual Meeting of the American Association of the History of Medicine at Duke University, Durham, N. C., April 19-21, 1956.

In order to stimulate study and research in the history of medicine, the Section presented a series of seven weekly seminars on the methods of teaching medical history at the Hall of the College from March 3 to April 14, 1955. These seminars, conducted by Drs. Richard H. Shryock and Owsei Temkin of the Institute of the History of Medicine of The Johns Hopkins University, were financially supported by the five medical schools of Philadelphia, each of which sent a faculty member with the aim of initiating courses in medical history at the respective schools. In addition, all other interested persons were invited to attend these valuable seminars. The faculty members and their medical schols were: Drs. Robert J. Hunter, University of Pennsylvania; Charles Sawitz, Jefferson Medical College; Harold A. Taggart, Hahnemann Medical College; June F. Klinghoffer, Woman's Medical College; and Fred B. Rogers, Temple University. As a result

of these sessions with Drs. Shryock and Temkin, three of the Philadelphia schools have presented courses to their first or second year classes during the current academic year.

On November 22, 1955, a Semi-Centennial Meeting of the College's Section on Medical History (founded in 1905) was held. Dr. Walton B. McDaniel, 2d, Curator of the Library's Historical Collections, spoke on "Expanding the Use of the Library's Historical Collections." At this meeting the Section accepted the Library administration's invitation to cooperate actively in plans for increasing and expanding the use of the Library's famous historical collections. Building additions recently completed at the Hall of the College have improved the situation of these historical collections. A Packard-Krumbhaar Medical History Alcove, adjacent to the Curator's Office, has been installed where hundreds of historical references on open shelves, and rare books brought to readers there, may be consulted under comfortable conditions. Also rare books and other historical material have been collected on one floor of the new stacks, where they can be studied as a unit.

In view of the Library's limited funds for purchases of historical material, the Section has recently also established an informal group known as *The Friends of The Library's Historical Section*, composed of Fellows of the College and others interested in adding to, and increasing the use of the historical collections. An organization meeting of the *Friends* and formal opening of the Packard-Krumbhaar Medical History Alcove plus a visit to the historical floor of the new stacks, will be held at the College Hall on May 1, 1956.

On January 17, 1956, the College of Physicians of Philadelphia joined numerous other institutions throughout the world in celebrating the 250th anniversary of the birth of Benjamin Franklin. Dr. Scheffey, President of the College, presided at this meeting and announced that the College would receive a Commemorative Medal from the Congress of the United States as one of the learned scientific, educational and welfare societies active during Franklin's lifetime (1787). The medal, one of 50 authorized by the Secretary of the Treasury and designed by Mrs. Laura Gardin Fraser, was presented to the College on April 4, 1956, by Mr. Clarence L. Jordan, Chairman of the Franklin Anniversary Committee. Dr. Scheffey accepted the medal on behalf of the College at the latter date. The Section's program on January 17 included: Dr. Herbert S. Klickstein, "Benjamin Franklin and Antoine Laurent Lavoisier"; Dr. Fred B. Rogers, "Dr. Jonathan Odell—Critic of Franklin"; Dr. Walton B. McDaniel, 2d, "Benjamin Franklin's Vision of the Extension of Human Life to Antediluvian Standards."

In order to stimulate interest in medical history among the medical students in Philadelphia, the Section is again sponsoring its Prize Essay Contest this year. The subject may be on any aspect of medical history or the medical humanities. The prize of one hundred dollars will be awarded at a Section dinner to which all students submitting an essay will be invited as guests of the Section on Medical History.

Dean Jeremiah S. Finch of Princeton University, author of *Sir Thomas Browne, a Doctor's Life of Science and Faith*, delivered the Kate Hurd Mead Class of 1888 Lecture in Medical History of the Woman's Medical College of Pennsylvania at the Hall of the College on April 3, 1956. Dean Finch's topic was "The Lasting

Influence of Sir Thomas Browne." This annual dinner meeting is sponsored by the Woman's Medical College and held in conjunction with the Section on Medical History of the College of Physicians of Philadelphia.

FRED B. ROGERS, *Clerk*

The George W. Corner Society of the History of Medicine

The George W. Corner Society of the History of Medicine (University of Rochester School of Medicine, Rochester, N. Y.) has held two meetings during 1955-56.

On October 7, 1955, Dr. Chauncey D. Leake, Chairman of the Department of Pharmacology, Ohio State University, was the guest speaker. His talk "The Ancient Egyptian Medical Papyri" was illustrated with slides. A display of books and articles by Dr. Leake was exhibited in the Medical Library.

In January 1956, Dr. René Dubos of the Rockefeller Institute for Medical Research talked on the "Contributions of Metchnikoff to the History of Medicine."

Another meeting is contemplated for early spring.

The officers for 1955-56 are as follows:

Chairman:	George Mizner
Co-Chairman:	William Hammond
Secretary:	C. Raymond Shepardson

JOHN A. BENJAMIN, M. D., *Faculty-Advisor*

The Johns Hopkins Institute of the History of Medicine

Dr. Shryock reported that the complete annual report for the Institute would be published as usual in the *Bulletin*.

The Johns Hopkins Medical History Club

The Johns Hopkins Medical History Club sponsored a dinner in honor of Dr. George W. Corner on November 22, 1955. Addresses were presented by Dr. Samuel R. M. Reynolds and Dr. Philip Bard to which Dr. Corner responded. At a meeting on May 14, 1956, Dr. Percival Bailey presented his impressions of Harvey Cushing in a paper entitled "Pepper Pot." The new officers elected are: Victor A. McKusick, President; Richard H. Shryock, Vice-President; John C. Harvey, Secretary.

OWSEI TEMKIN, *Delegate*

The New York Academy of Medicine, Section on Historical and Cultural Medicine

During the past eight months, five original papers that had been read before the Section were published in the *Bulletin* of the Academy:

"Venesection, Before Harvey and After" by Delevan V. Holman (September 1955).

"The Antecedents of Blood Transfer" by Lester Blum and William M. Nelson (September 1955).

"Robert Abbe: Pioneer in Plastic Surgery" by Richard B. Stark (December 1955).

"Robert Abbe: Pioneer in Neurosurgery" by Herbert Parsons (January 1956).

"Robert Abbe: Founder of Radium Therapy in America" by Sidney M. Silverstone (February 1956).

At a regular meeting of the Section on May 11, 1955, the centenary of Florence Nightingale's magnificent achievement during the Crimean War in founding the profession of scientific nursing was celebrated. Mr. F. B. A. Rundall, British Consul General in New York spoke on "Her Place in British History." Miss Margaret G. Arnstein, Chief of the Division of Nursing Resources, United States Public Health Service, discussed "Her Influence on Nursing." Dr. Frank B. Berry, Assistant Secretary of Defense, Health and Medical Affairs, traced "Her Influence on Military Medicine."

Officers of the Section for the next year were elected: Chairman, Hilton H. Stothers; Secretary, Alan F. Guttmacher; Member of the Advisory Committee for five years, McIver Woody.

On November 16, 1955, the in-coming chairman, Dr. Hilton H. Stothers, presided at a joint meeting with the Section on Otolaryngology in honor of Manuel Garcia and his visualization of the human larynx by his mirror in 1885. The first speaker was Dr. John Kernan, Emeritus Professor of Otolaryngology, College of Physicians and Surgeons, Columbia University. The second speaker was Dr. Louis H. Clerf, Emeritus Professor of Laryngology and Broncho-Esophagology, Jefferson Medical College.

The next regular meeting of the Section on January 11, 1956, was devoted to "Art and Medicine." Dr. Frank H. Netter of Ciba Pharmaceutical Products said that the function of the medical artist is to translate the mental image into actuality, and thus to preserve the anatomical knowledge of each generation for posterity. He traced the development of medical art from ancient times to the great artists of the Renaissance. Finally, he summarized his own career from the beginning, and described the technique he uses for most of his work. Other speakers were: Dr. Meyer M. Melicow, Past-President of the American Physicians' Art Association; and Mr. William S. Wyatt, Lecturer on Drawing, Columbia University.

On March 14, 1956, Chairman Hilton H. Stothers presided at a joint meeting of the Section with the Section on Obstetrics and Gynecology commemorating the contributions of J. Marion Sims and the centenary of the founding of the Woman's Hospital. Dr. Albert H. Aldridge, Director of Obstetrics and Gynecology, Woman's Hospital, now a division of St. Luke's Hospital, told "The Story of Woman's Hospital" from the beginning. He described Sims' early days in Montgomery, Alabama, where his first successful closure of a vesico-vaginal fistula was performed; his move to New York City in 1853, where his genius and persistence built the Woman's Hospital with the aid of 30 socially prominent women; his exile during the Civil War, and his return and death in 1883.

The second speaker, Dr. James Marr, Attending Surgeon at the Women's Hospital, read a paper on "Thomas Addis Emmett's Contributions to Gynecology." The third speaker was Dr. Claude E. Heaton, whose subject was "The Influence of J. Marion Sims on Gynecology."

Nominations for the ensuing year are: Member of the Advisory Committee for five years, Hilton H. Stothers; Chairman, Alan F. Guttmacher; Secretary, Richard B. Stark.

McIver Woody, *Delegate*

Providence Medical History Society

The Providence Medical Historical Society is still in its infancy and we have limited it to ten members and a few invited guests. For the present we have three meetings a year held in the Rhode Island Medical Library. At each meeting a paper is presented by one of the members on some phase of medical history, following which there is usually a very interesting discussion.

The officers of our organization include only a secretary, although Dr. Irving Beck of 355 Thayer Street, Providence, has been appointed delegate to the national society. We are looking forward to a closer association with other similar local organizations even though our activities are definitely of a limited scope.

ELIHU S. WING, JR., *Secretary*

Society for the History of Medical Science, Los Angeles

The Society for the History of Medical Science scheduled four general meetings and two Council meetings in 1955/56. Membership at the present time totals 171 members of whom 123 are active, 38 associate, and 10 honorary members. Officers for the year are Dr. John Field, President, Dr. Jessie Marmorston, Vice-President, Miss Louise Darling, Secretary, Dr. Clarence Agress, Treasurer, and Dr. Lawrence Powell, Archivist. Dr. Robert Tschirgi is serving as Program Chairman.

The first general meeting was held on November 15 when Dr. Robert Tschirgi of the UCLA Departments of Physiology and Anatomy spoke on "Amber, Silk, and Frog Legs: Galvani's Experiments and the Development of Electrical Theory in Biology." Highlight of the lecture was a demonstration of Galvani's original experiment on conduction of current from a static electricity generator to a pair of frog legs—in this case what appeared to be the largest pair of frog legs on record.

At the winter meeting of February 16, Dr. Claude Jones of the UCLA Department of English presented an entertaining and informative account of "The Doctor as Novelist: Tobias Smollett, M. D., 1721-1771." As background for the lecture the UCLA Biomedical Library exhibited some of Dr. Jones' books on Smollett and his contemporaries, medical and literary, and a collection of original Hogarth caricatures illustrating various aspects of medicine and public health in eighteenth century England.

The spring meeting, scheduled for April 6, will have as the main part of its program an illustrated lecture by Dr. William Lessa of the UCLA Department of Anthropology on "Body Divination: Forerunner of Human Constitution." A new exhibit drawn largely from Dr. Lessa's private collection on chiromancy, metoposcopy, neomancy, physiognomy, phrenology, and biotypology has been assembled for this meeting. Exhibits for the Society are on display a week or so in advance of meetings and continued for four or five weeks afterwards.

The last meeting of the year on May 29 is sponsored jointly by the Society and the UCLA School of Medicine's Division of Medical History. Dr. Lloyd Stevenson of McGill University will lecture on "Suspended Animation."

The Society's John Fulton Medal Essay Competition is in its second year. The medal and a small monetary award were won last June by Mr. Donald Newman, freshman medical student at UCLA, for his paper on legal aspects of inoculation for smallpox in New England. The occasion was a particularly happy one, for Dr. Fulton himself presented the awards. Prizes will be awarded at the May meeting this year if a paper of sufficient merit is submitted.

LOUISE DARLING, *Secretary*

Society of Medical History of Chicago

The Society has had a year of growth and vigor. Its membership has increased and the attendance at all of the six meetings held has been excellent. The programs of the six meetings are as follows:

1. Meeting on October 19, 1955

George Halperin, M. D.: "Nikolai Ivanovich Pirgov—Anatomist, Surgeon, Educator."

Dieter Koch-Weser, M. D.: "The Migration of Diseases."

Miss Esther Vincent: "John Keats, a Medical Truant."

2. Joint Meeting with the Institute of Medicine, the Chicago Pathological Society on November 14, 1955. Dr. Esmond R. Long, Director of the Henry Phipps Institute of the University of Pennsylvania gave the Richard H. Jaffe Lecture of the Institute of Medicine. The meeting was devoted to a memorial to the late Dr. Ludwig Hektoen.

3. Meeting on December 15, 1955:

Lester S. King, M. D.: "Similia Similibus."

I. Davidsohn, M. D.: "Medical Caricatures—A Mirror of Medical History."

4. Meeting on January 18, 1956:

Eugene M. K. Geiling, M. D.: "John Jacob Abel, Founder of American Pharmacology."

Leo M. Zimmerman, M. D.: "Iconography of Medical Interest in Painting and Sculpture."

5. Meeting on March 8, 1956:

Barry J. Anson, Ph. D.: "Monsters and Monstrosities in the *Collected Workes* of Ambroise Paré."

Michael L. Mason, M. D.: "Paracelsian Surgery."

6. Meeting on April 11, 1956:

Joseph P. Renald: "'Doctor' Wirz of Andersonville Prison."

Paul R. Cannon, M. D.: "Changing the Face of the World."

LEO M. ZIMMERMAN, *Secretary*

Frederick R. Taylor History of Medicine Society

On April 26, 1955, the Constitution of the first History of Medicine Society at the Bowman-Gray School of Medicine was presented and accepted by the students and faculty as well as other interested people. The organization of this Society and the framing of the constitution were largely due to the stimulus of two men, Dr. Robert Prichard, now in Thailand on a two-year leave of absence with the U. S. Public Health Service, and Dr. Mack Parrish, now at the Department of Preventive Medicine, Yale University School of Medicine.

The Society was named the Frederick R. Taylor History of Medicine Society in honor of Dr. Taylor of High Point, N. C., who was a pioneer as well as a scholar in early North Carolina medicine. Meetings were to be held quarterly during the academic year.

The Society's executive structure consists of a Board of Directors composed of

faculty members to insure permanent functioning. Those appointed at the initial meeting were: Robert W. Prichard, M. D., Richard L. Burt, M. D., Charles E. Richard, M. D., and Robert L. Tuttle, M. D. Because of the absence of Dr. Prichard and Dr. Richard, Miss Nelle Benton, librarian, Warren Andrew, Ph. D., and Martin Netsky, M. D., were appointed to fill the vacancies on this board. The executive officers elected by the majority vote at the initial meeting to serve during the past year were: Hal M. Stuart, President, Earl W. Parker, Vice-President, and J. Bernard Vick, Secretary-Teasurer.

During the Spring of 1955 our Society received an invitation to join the American Association of the History of Medicine. This the 65 charter members did with expedition.

The Society during the past year has presented a number of speakers:

Dr. William H. Strickland, Jr., on "Early Medical Education in North Carolina."

Dr. Frederick R. Taylor on "Some Famous Doctors I Have Known."

Dr. Wingate Johnson on "The History of the Bowman-Gray School of Medicine."

An award has been established by the Society to be given annually to the student who writes and presents to the Society the best paper on a subject pertaining to the history of medicine. Zeb Burton, a junior at the Bowman-Gray School of Medicine, was the winner of the past year with a paper on "Life and Work of Dr. Ignaz Philipp Semmelweis."

After one year of organization the Society is composed of 77 members of whom 51 are residing in the immediate vicinity of Bowman-Gray.

The Society has operated on a budget of $94.10 of which $51.79 remains in the treasury.

J. Bernard Vick, *Secretary-Treasurer*

Josiah C. Trent Society for the History of Medicine

Its members meet every two months at which time informal papers are presented by its members. "The Evolution of Nursing" was discussed by Miss Thelma Ingles in January. In March "Social Service and Medicine" was presented by Miss Janet Wien, Director of the Social Service Department of Duke Hospital. In May Mrs. George Wilbanks gave a discussion of the "Doctors in American Literature."

Aside from these informal papers we had the honor of having Dr. Wesley Bourne, Emeritus Professor of Anesthesia at McGill University, who presented "Humanities and Science in Anesthesia" on May 3rd. The Annual Trent Memorial Lecture was delivered by Dr. Chauncey Leake who spoke on "The Development of the Concept of Physiology" on April 18th.

George J. D'Angelo

The History of Medicine Society of Tulane University of Louisiana

The Tulane History of Medicine Society has a membership list of about sixty members and a very active nucleus of about twenty members who regularly attend

meetings. We charge yearly dues of $7.50 which includes one place at the annual banquet.

William E. Riecken, Jr., of Jackson, Mississippi, is the current president, and presented an enjoyable series of speakers for this year. The first talk of the year was by Dr. H. Mayerson, Head of the Department of Physiology at Tulane, who spoke on "Dr. Bennett Dowler, the Forgotten Physiologist." This was followed by a talk by Dr. Harold Cummins, Head of the Department of Anatomy here at Tulane, entitled: "The History of Anatomy at Tulane." Miss M. L. Marshall, Head Librarian of the Tulane Medical Library and the Orleans Parish Medical Library, then gave a talk titled: "Changing Ideas in Medical Education."

The following two talks were given by student members. William Riecken spoke on Nathan Smith Davis, the founder of the A. M. A., and Donald Gordillo gave a talk titled: "Samuel Hahnemann—The Birth of Homeopathy."

Two papers are still scheduled. Marvin Rothenberg, a senior student member, will speak on April 20th on the history of chiropractic. He will be followed by Dr. Vincent J. Derbes of the Department of Medicine of Tulane who will speak on the history of bronchial asthma.

THOMAS M. QUEHL

The Robert Wilson Medical History Club of Charleston

Program, 1955-1956:

October: "The Eye, Ear, Nose, and Throat Specialty in Charleston" by Dr. R. W. Hanckel.

December: "History of Maternal Nursing" by Dr. James Wilson.

January: "Dr. Slop" by Dr. J. I. Waring.

February: "Witchcraft" by Dr. Norton Williams.

March: "To Run or Not to Run (Illnesses of the Presidents)" by Dr. Robert Wilson, Jr.

April: "Elisha Poinsett, M. D." by Dr. Edward Izard.

May: "Early South Carolina Psychiatry" by Dr. Joseph Marshall.

JOSEPH I. WARING, *Delegate*

VII. OTHER BUSINESS

Dr. Lloyd G. Stevenson moved a vote of thanks to Dr. Ilza Veith for her services to the Association and her efforts to carry on as Secretary-Treasurer. The motion was duly seconded and carried unanimously.

Upon motion duly made and seconded, the Council voted to adjourn sine die.

BUSINESS MEETING

The Vice-President, Dr. Benjamin Spector, called the Annual Business Meeting of the membership to order at 12:30 p. m., on Friday, 20 April 1956, in the Men's Graduate Center, Duke University.

Dr. Spector asked the Members to stand while the Secretary-Treasurer read the necrology since the last meeting:

Dr. Isaac A. Abt
Dr. H. Sheridan Baketel
Mr. James F. Ballard
Dr. Reuben Friedman
Dr. Abraham Levinson
Dr. Edward J. McGrath
Dr. Thomas G. Orr
Dr. H. G. Partridge
Dr. Joseph Hersey Pratt
Dr. George Sarton (Honorary Member)
Dr. Thomas A. Shallow
Dr. Frederick R. Taylor
Dr. Frederick C. Waite
Dr. R. J. Whitacre

Report of the Council Meeting

Upon motion duly made and seconded, the Association voted to dispense with the presentation of the report of the Council Meeting.

Election of Officers

The Secretary-Treasurer read the following official list of nominations for officers and committees to be elected at the Annual Meeting, and reported that there had been no nominations from the floor.

For *President:*	Benjamin Spector
For *Vice-President:*	Owsei Temkin
For *Executive Committee:*	Erwin H. Ackerknecht
	George Rosen
	David A. Tucker, Jr.
	Leo M. Zimmerman
For *Editorial Committee:*	Lloyd G. Stevenson, *Chairman*
	Madeline E. Stanton
	Herbert S. Klickstein
For *Nominating Committee:*	Jean A. Curran, Chairman
	George J. D'Angelo
	Genevieve Miller

Upon motion duly made and seconded, the Association unanimously voted to elect the entire slate.

Report of the Johns Hopkins University

The Secretary-Treasurer presented to the Association the following financial statement from The Johns Hopkins University with regard to the *Bulletin of the History of Medicine.*

The Johns Hopkins University March 14, 1956

BULLETIN OF THE HISTORY OF MEDICINE

Income and Expenditures for Year 1955

Receipts:		
Subscriptions—Members A. A. H. M.		$ 2,951.68
Subscriptions—To The Johns Hopkins Press		2,445.24
Single Issues		450.83
Reprints		283.75
Disbursements:		
Printing and Binding of Volume XXIX:		
January-February	$ 868.78	
March-April	843.37	
May-June	896.33	
July-August	895.93	
September-October	952.38	
November-December	1,073.90	
		$ 5,530.69
Assistant to the Editor (Jan. 1, 1955 to June 30, 1955)		1,000.00
Assistant Editor (July 1, 1955 to December 31, 1955)		1,200.00
Additional Reprints		247.95
Commission to Press		2,155.30
Commission to Sales Agents		14.66
Miscellaneous Expense Write-off		6.89
		$10,155.49
Funds expended by The Johns Hopkins University		$ 4,023.99

The Johns Hopkins University
John H. Gilliece,
Assistant Treasurer & Comptroller

Report of the Auditing Committee

The Auditing Committee reported that the accounts presented by the Secretary-Treasurer appeared to be correct.

New Business

Upon motion duly made and seconded, the Association unanimously voted to thank the President, Dr. George W. Corner, for his able conduct of the office and to express to him the warm good wishes of the Members.

Upon motion duly made and seconded, the Association unanimously carried a cordial vote of thanks to both Duke University and the University of North Carolina for their splendid hospitality, which has contributed so much to the enjoyment and success of this meeting, and directed the Secretary-Treasurer to send suitable letters to the appropriate officers of both universities expressing the sentiments of the Association.

Upon motion duly made and seconded, the Association adjourned the Business Meeting sine die.

John B. Blake, *Secretary-Treasurer*

ANNOUNCEMENTS

NATIONAL NEWS

Federal Food and Drugs Act

June 30, 1956, marked the fiftieth anniversary of the passage of the original Federal Food and Drugs Act. In Washington, the Smithsonian Institution and the Food and Drug Administration jointly announce the opening of an exhibit commemorating the event. The exhibit will be open for the remainder of the year in the Smithsonian's Arts and Industries Building. In New York, the Library of the New York Academy of Medicine is also presenting an exhibit which will be on display until October 1 at 2 East 103rd St.

New York

The State University of New York announces a series of Symposia to be held at the College of Medicine at New York City, 450 Clarkson Ave., Brooklyn, N. Y., during the coming academic year. These Symposia will deal with the historical development of physiological thought in the medical sciences.

The first Symposium, which will be held on November 13, 14, and 15, 1956, will consist of the following presentations:

November 13:

4:30 p. m.: "The Dependence of Medicine upon Basic Scientific Thought," Dr. O. Temkin.

8:00 p. m.: "Physiology and the Recurrent Problem of Vitalism," Dr. I. Galdston.

November 14:

4:30 p. m.: "The Structural Basis of Function and Anatomical Reasoning in Physiological Thought," Dr. L. G. Stevenson.

8:00 p. m.: "Development of Ideas Relating the Brain with the Mind," Dr. H. W. Magoun.

November 15:

4:30 p. m.: "Development of Knowledge of the Cardiovascular System," Dr. C. Leake.

Washington

The Armed Forces Institute of Pathology announces the retirement of Colonel Hugh R. Gilmore, Jr., MC, USA, Curator of the Medical Museum of the Armed Forces Institute of Pathology. Captain Samuel W. Kime, MC, USA, has been named Acting Curator of the Medical Museum.

BOOK REVIEWS

Bibliotheca Walleriana: The Books Illustrating the History of Medicine and Science Collected by Dr. Erik Waller and Bequeathed to the Library of the Royal University of Uppsala. A Catalogue Compiled by Hans Sallander. *2* vols. Stockholm: Almquist & Wiksell, 1955. (Acta Bibliothecae R. Universitatis Upsaliensis, vol. 8-9) xii + 471, 494 pp. Ill. Sw. Kr. 200.

From Ulrich Ellenbog and Nicolaus Pol, in the 15th century, through Osler, Cushing, Klebs, of recent memory, to their spiritual descendants operative at this moment, the bibliophilic physician has often contributed in breadth and depth to our knowledge of, and access to, the literature of medicine. *The lambes and rabbots swetlie rune at base, Whilst highest trees the litle squiriles clime.*

A recent note in this journal [1] reported the death, in January, 1955, of the

[1] 30: 88-90, Jan./Feb., 1956.

Swedish surgeon Dr. [Axel] Erik Waller, whom an American authority has characterized as one of the great medical humanists, and the foremost medical book-collector, of our time. The Librarian of the Royal University of Uppsala, in his Preface to this eagerly awaited catalogue of the internationally famous Bibliotheca Walleriana, says that "It is hardly an exaggeration to say that this collection, in the fields it covers, is unparalleled in modern times. It comprises practically all major works published in the realm of medicine before 1800, as well as a highly representative selection of later literature on the subject. While the famous collections of Sir William Osler and Dr. Cushing each comprise some 8,000 items, Dr. Waller's includes nearly 21,000, and it is also far superior in quality."

Volume I is divided into the following classes: Incunabula; Medicine; Veterinary medicine; Dentistry. Volume II uses these rubrics: Natural sciences in general; Chemistry and alchemy; Physics; Botany; Zoology; Astronomy; Other natural sciences; History of science in general; History of medicine; History of natural sciences; Biography, general; Biography, special; Bibliography; Literature on autographs; Miscellaneous; Supplement; Index. There are, further, 55 extraordinarily well-produced plates, many of them apparently selected for their interesting inscriptions.

Of the 150 incunabula, 10 are not listed in Stillwell. These include an almanach, and rare editions of well-known works of Albertus Magnus, Arnold of Villa Nova, Grünpeck, Jacobi (Kamintus, etc.), von Bayerland, and the *Vie de Saint Roch*. In connection with the Pantaleo *Pillularium*, of which only four copies appear to be known, it may be observed that the Cushing copy indicated by Stillwell as the only one in this country later proved to be a 16th century imprint. There is a copy of the Waller, 15th century, edition in Philadelphia, however.

In view of the wide scientific net spread by Dr. Waller, there is reason to note that over three-fourths of the catalogued items fall in the classes Medicine, History of medicine, Biography (special), and Bibliography—the first, by itself, accounting for some 10,355 entries. A fair measure of such a collection cannot be arrived at, of course, until its catalogue has been lived with and subjected to all sorts of

reasonable and whimsical demands over a considerable period of time. One may note that the Bibliotheca Walleriana contains two important Vesalius editions not in the probably superior Cushing collection of Vesaliana; or that the numerically inferior Bibliotheca Osleriana contains, say, 5 Vesalius items not in the Bibliotheca Walleriana; or that Cushing and Waller each have 43 Paré editions; or the possibility that Mr. Denis I. Duveen may develop chloropia on discovering that Dr. Waller's collection contains 35 editions not in his own Bibliotheca (Alchemica and Chemica). The only possible use for such trivial observations, however, is their reminder that every collection has a logic of its own, and a great one, the capacity to add in its own way to the commonwealth of knowledge.

The catalogue proper employs a double-column page, except for the section of incunabula. The type is necessarily small, but entries in bold face, and well-calculated leading, offset this disadvantage in large measure. Entries under an author's name follow the order obtaining in the standard bibliographies (Keynes, Cushing, Doe, etc.); where an authoritative printed bibliography of the author's work was not available, the editions of his works are entered by title, alphabetically—which, of course, often separates different editions of the same work. While the practice of giving titles in full might seem economically extravagant, in view of the existence of the *Index-catalogue*, the data obviously were required to support the magnificent 94-page Index. One of the probable results of this is that many who have the *Index-catalogue* at hand will, for such purposes as verification, have a go, first, at this smaller, more easily managed catalogue. Occasional notes on inscriptions and bookplates of special interest are welcome indeed in a catalogue whose size precluded any consistent attention to humanistic details.

The planning, actual preparation, and printing of a catalogue of some 21,000 items is obviously a complex and costly undertaking. It is, therefore, especially agreeable to be able to suggest that Mr. Sallander, his sponsors, and his collaborators, have admirably realized their hope of producing a catalogue that, " in addition to being a worthy monument to a devoted and successful collector, will be a valuable tool in the hands of those engaged in research in the history of medicine and science." They may regret only, with us, that the price of the catalogue, of which only 1,600 copies have been printed, may limit its distribution to the more affluent libraries, book-collectors, and book-dealers. On the other hand, it is precisely these, fortunately, whose hands will be most quickly outstretched to it in warm welcome.

W. B. McDaniel, 2d

George Sarton. *The Appreciation of Ancient and Medieval Science During the Renaissance (1450-1600)*. Philadelphia: University of Pennsylvania Press. 1955. xvii + 233 pp. $5.00.

Dr. Sarton here surveys printed books, their authors, and printers, in the fields of medicine, natural history, mathematics and astronomy, for the period 1450-1600, with stress upon the survival or revival of ancient Greek and Latin works. The material of the survey was originally presented in the form of lectures, three

delivered under the Rosenbach Fellowship in Bibliography at the University of Pennsylvania in January, 1953, and the fourth at the American Philosophical Society in Philadelphia on March 24 of the same year. In the course of being prepared for publication, the original lectures have been greatly expanded by the addition of details and references. The result is a book which will be useful to scholars both for its richness of bibliographical detail and for its delineation of the general features of an intellectual world.

As the author points out, to have traced a comprehensive intellectual map of the period with the same inclusiveness and scope with which he had, in his *Introduction to the History of Science*, mapped the centuries through the fourteenth, would have required many thousands of pages; and the present survey has a more limited aim. In each of the fields named, it commences with an account of editions and translations of the classical Greek and Latin works, and then proceeds to sixteenth-century works which grow out of the renewed classical tradition but which tend increasingly to diverge from it. In general outline, the story which emerges is one of humanist reaction and ipsedixism during the earlier part of the period, with a shift in certain cases towards independent scientific investigation in the later part.

In medicine the humanist revival centered round Hippocrates and Galen. Passing in review the major sixteenth century translators and editors of the Hippocratic and Galenic works—Fabio Calvi, William Cop, Nicholas Leoniceno, Janus Cornarius, Geronimo Mercuriali, and Anuce Foes in the case of Hippocrates; Joachim Camerarius, Leonhart Fuchs, Hieronymus Gemusaeus, Symphorien Champier, Thomas Linacre, Leoniceno, Giovanni Manardi, Rabelais, John Caius, and Antonio Brasàvola in the case of Galen—Sarton finds a strong anti-Arabic tendency in the medical thought of the period, and a conviction that medical truth had been explained in the best manner by the Greek physicians.

Besides the traditions of Hippocrates and Galen, Sarton also deals with those of Celsus (first-century author of a Latin treatise *De medicina*); the great second-century methodist Soranos of Ephesos; four Byzantine physicians, Oribasios of Pergamon (fourth century), Aëtios of Amida (sixth century), Alexandros of Tralleis (sixth century), and Paulos of Aigina (seventh century); and the Arab Avicenna (eleventh century). Though not unknown during the medieval period, these authors received a new kind of attention, primarily philological, from sixteenth-century humanists. In connection with Soranos, Sarton corrects the persistent error which attributes his treatises on chronic and acute diseases to their fifth-century translator, Caelius Aurelianus. A consideration of the translations and editions of Avicenna's *Canon* was appropriate, for despite the attempt of humanism to purge medicine of Arabic accretions, the *Canon* remained a standard medical encyclopedia through the sixteenth and seventeenth centuries.

On the whole the humanist reaction in medicine appears to have discouraged progress in clinical methods. The preparation of a new edition or translation of a Greek text was regarded as the best road to medical preferment. According to Sarton, "the medical Renaissance was essentially philological (not clinical or physiological); it was humanistic with a vengeance" (p. 50).

The picture is less dark in the case of natural history. Sarton takes into consideration the traditions connected with Aristotle's books on animals, the botanical treatises of Theophrastos and Dioscorides, and Pliny's *Natural History*.

Here one can point to a series of sixteenth-century investigators who, knowing the classical tradition and partly stimulated by it, went on to an independent description of plants and animals. Thus William Turner, Guillaume Rondelet, Pierre Belon, Ippolito Salviani, Jean Ruel, Conrad Gesner, Andrea Cesalpino, Adam Zaluzansky, Valerius Cordus, Pier Andrea Mattioli, Fabio Colonna, Ulisse Aldrovandi, Otto Brunfels, Leonhart Fuchs, Jerome Bock—to name those with whom Sarton deals most extensively. A special section is devoted to the development of engraving and of naturalistic illustrations for botanical texts. "The printed image was the savior. As soon as scholars realized the need of illustrating ancient texts by means of illustrations drawn from nature itself, the artists did their work and drove the philologists away . . . Science was the winner" (p. 95).

In mathematics Sarton deals with the traditions of Plato and Aristotle, Euclid, Archimedes, Apollonios, and Ptolemy, and with the arithmetic, algebra, and trigonometry books of the period. Here the increased interest in classical texts undoubtedly made for progress. The editing or translating of Euclid's *Elements*, Apollonios' *Conics*, or treatises of Archimedes would naturally lead to an interest in the mathematical proofs themselves, and these could be tested without the arduous labor of consulting the book of nature. At least in this particular period of its development, mathematics suffered less than other branches of learning from the pitfalls of the humanistic concern for *ipsissima verba*. Thus François Viète, while attempting a "renovatio" of the analytical method which the ancient mathematicians were supposed to have concealed, could arrive at something essentially new.

The final section or Epilogue reviews certain general features of the science and thought of the period 1450-1600. Sarton takes the invention of printing as the event defining the start of the period, and the appearance of the works of Bacon and Harvey, Galileo and Kepler, as marking its end. Certainly the invention of printing and development of engraving, with—as Sarton emphasizes—the resulting production of *standard* texts and *standard* illustrations, helped change the intellectual face of the world. But as Sarton also points out, there was a negative side. Printing coupled with humanism meant predominately a new lease on life for old ideas rather than a diffusion of new ones. A full view of the period has also to take into account the religious conflict, the enormous alchemical and astrological literature, and the existence of a series of iconoclastic innovators like Paracelsus.

Finally, one should mention an aspect of the period which frequently appears in its full prominence only with a more detailed textual analysis of Renaissance works than Sarton gives: the persistence or appropriation of theories and modes of thinking which stem from the immediately preceding centuries, the thirteenth and fourteenth. Indeed, one might question the applicability of the term "Renaissance" to a period which is neither an exact rebirth of something ancient nor a birth of something totally novel. The term, although well established in historical writing, carries misleading overtones. Sarton's study, through its detailed accuracy, has precisely the merit of pointing out the variety of the period, the negative and positive elements which together define its intellectual life and which frequently contradict the traditional image of the "Renaissance."

CURTIS WILSON

WALTHER RIESE. *The Conception of Disease, Its History, Its Versions and Its Nature*. New York: Philosophical Library, 1953. 120 pp. $3.75.

W. RIESE. *La Pensée Morale en Médecine*. Premiers Principes d'une Ethique Médicale. Préface du Pr. Henri Baruk. Paris: Presses Universitaires de France, 1954. xi + 84 pp. 420 francs [Bibliothèque de Philosophie Contemporaire].

Dr. Riese has published two books in which he makes use of a similar method. In the one he analyzes the concept of disease, while in the other his analysis extends to the moral principles underlying medicine. Neither of the two books is a history of its respective subject, yet both utilize a historical approach.

The latter statement holds particularly true of *The Conception of Disease*. It can, perhaps, be characterized as a typology of the notions of disease. Dr. Riese rightly states that "the various concepts of disease have always been overlapping" (Foreword). The book begins with "The Stoic Conception of Disease," and the last chapter deals with "The Metaphysic Conception of Disease" (followed by an epilogue on "Disease and Health"). The concepts discussed in between are: The Platonic or Cosmological, Anthropological, Moral, Hippocratic or Historical, "Medicina Prima (Baglivi) or The Natural History of Disease," The Galenic or Physiological Concept, The Anatomical (Leonardo da Vinci to Virchow), Etiological, Social, Psychologic, Ontologic, Biographic. Included also is a short essay on "Nosography and Biography." The list indicates not only the many facets which Dr. Riese considers but also his imaginativeness which makes him bestow a great many interesting ideas upon the book. In spite of its lack of stylistic polish the book is worth while reading and is recommended to those whose knowledge of medical history allows them to evaluate it critically.

After having experienced the stimulating effect of the book the reader may, however, feel somewhat out of breath. This feeling is caused by the author's tendency to present, in short chapters, aperçus rather than well connected and carefully elaborated arguments. For instance, on p. 54 we meet with the interesting idea that Vesalius' exposition of the abdominal organs "in a torso, deprived of its head and only with stumps of its members" recalls the remnants of Greek art (p. 54). On the next page we are intrigued by the question whether we should not "recognize in Vesalius' headless torso of the abdominal cavity the expressions of the great distance between the lowest part of the soul, and the reason, and the isolation of the former from the latter"? Now it is quite possible that Vesalius and his artist combined archeological and Platonic symbolism, but we would like to hear more argument than is offered.

A logical study like the present represents a difficult task and the author must expect disagreement not only in detail but even as to the thesis as a whole. Of this, Dr. Riese seems aware when he says that "disease exists only in man's mind, provocative as this statement might be" (p. 37). He means (rightly, I think) that what is called disease represents our synthesis of a series of events or symptoms into a conceptual unit. For this very reason minds of different men living at different times have formed different ideas of disease, ideas that cannot simply be arranged along a line of progress. But in an intrinsically difficult work the author should not leave the reader with so many unnecessary puzzles. At the very outset

the reader will ask himself whether it is altogether permissible to put Stoic and Platonic conceptions of disease on the same level as those elaborated by physicians. The Stoic denial of disease (p. 3) apparently was compatible with a strong influence exerted by the philosophy of this sect upon Greek physicians. How is this to be explained? As to Plato, Dr. Riese cites the remarkable passage in the *Timaeus* (89 B) where diseases are compared to living creatures having a predestined period of life. I do not know of any place in Greek literature where an "ontological" concept of disease is so clearly stated or more stress laid on the time element of the disease process. In view of this passage I would have hesitated to say "that Plato did not integrate the chronological element in his general concept of disease" (p. 7). Rather, I would have doubted the intention on Plato's part to speak in the *Timaeus* of disease in the manner of a physician like the author of the Hippocratic *Epidemics*. Or to give other examples, while it is true that Galen's acknowledgement of the "topic constituent" of disease is sometimes overlooked by medical historians (p. 42), is it not equally true that credit for its emphatic recognition should go to Herophilus and Erasistratus (Celsus, Proem. 23 ff.)? On the other hand, how can the claim for Galen be reconciled with the statement of the next chapter that "even from a most superficial knowledge of Galen's medical thought, one would conclude that Galen could not possibly develop a truly anatomical conception of disease" (p. 47 f.)? It is hard to agree with Dr. Riese when he writes: "Still everybody believes in diseases as concrete and perceptible realities, though, as far as I can see, nobody ever made an attempt to submit these realities to a discriminative analysis of their logical structure" (p. 88). Analysis of the concept of disease has long been attempted even in general works on logic, and modern medical authors suffer so badly from semantic nosophobia that they are torturing themselves by attempts to avoid the very word disease.

Comments on *La pensée morale en médecine* can be shorter because here the history of medicine plays a smaller part. Put in the form of a thesis: Dr. Riese believes that the moral principle in medicine lies in the relationship between the physician an dhis individual patient. For this reason it did not exist in primitive society where the physician had not yet an individual relationship to the patient. It emerged with Hippocratic medicine where it found formulation in the Oath. The bulk of the book and its main value consist in pointing out the implication of moral factors in diagnosis, indication, therapy, prognosis, prevention, expert testimony, and relationship between physicians. Dr. Riese recognizes the danger threatening medical ethics by the ever increasing collectivistic tendencies.

The historical discussion of the book centers largely around Hippocrates. Great as the importance of the Oath is, it should not be credited with doubtful features. I fail to see the "allusion to medical associations flourishing already at the time of the father of medicine" (p. 71). The "community of the followers" (*communauté des adhérents*, p. 16) remains rather nebulous. Such developments seem to belong to the middle ages which saw the emergence of medical corporations and of an etiquette regulating the interrelationship and social obligations of medical men. The latter point may be of minor importance to Dr. Riese's work which is concerned with ethics in the moral sense. But it is pertinent with regard to collectivistic tendencies which were stronger in the middle ages than in the liberal nineteenth century to which Dr. Riese frequently refers. The relative neglect

of the period between classical antiquity and the nineteenth and twentieth centuries is matched by the summary dismissal of pre-Hippocratic medicine. But we know too little about that long period to state categorically what did *not* exist. Moreover, we do know that the ethics of the Hippocratic Oath is not identical with the ethical principles (or lack of them) in the Hippocratic Collection. These instances may suffice to document our impression that a more detailed and thereby more concrete historical interpretation would have enhanced the readers' willingness to follow Dr. Riese in the intricacies of his thought.

OWSEI TEMKIN

PAUL F. RUSSELL. *Man's Mastery of Malaria.* London, New York and Toronto: Oxford University Press, 1955. xiv + 308 pp. Ill. $6.00.

This volume contains the University of London Heath Clark Lectures delivered at the London School of Hygiene and Tropical Medicine in 1953. It conforms to the stipulation in the Heath Clark bequest that the lectures emphasize "educational, cultural and humanistic aspects . . . of the history, development and progress of preventive medicine and tropical hygiene and their sanitary and social evolution both in temperate and tropical climates." The information presented is not intended as a definitive history of malaria but an appraisal of the field, in retrospect, at the present time and as a tentative forecast. In the Preface it is stated that "to master" does not mean eradication but "to overcome, defeat, reduce to subjection." The subject is considered in five sections, viz., etiology, therapy, prophylaxis, international aspects and social implications.

Under *etiology* the data are presented in the following sequence: the speculative age, discovery of the etiologic agent of malaria in circulating red blood cells, mosquito phase of the life cycle of the parasite, and the pre-erythrocytic stage. *Therapeutic aspects* fall into three periods, pre-cinchona, quinine treatment, and modern anti-malarial medication. *Prophylactic measures* began with drainage, followed by quinine treatment, then larvicidal control and those aimed at preventing *Anopheles* from biting man. Much of the success achieved in the United States and in several tropical countries culminated in the use of DDT, particularly as a residual spray inside human dwellings, with marked recession of malaria. However, Anopheles mosquitoes are gradually developing resistance to DDT and other insect toxicants, providing a serious problem for future control. Under "*International Aspects*" special mention is made of the activities of the World Health Organization, agencies of the U. S. government, and the Rockefeller Foundation. The section on social implications deals with increase in the world's population as a result of the prevention of malaria and other communicable diseases. It is imperative that "physicians, malariologists, and sanitarians integrate their activities with those of agriculturalists, demographers, social scientists, economists, educators, political and religious leaders," with the objective "not in bigger populations but in healthier communities."

The author has provided a wealth of source references, likewise useful "Index of Persons," "Index of Places" and "General (Subject) Index." There is

abundant evidence of the scholarly way in which the material has been collected and assembled. It is presented objectively yet dynamically, in the appealing style which characterizes Dr. Russell's writings. The format is pleasing, the text is almost free of typographical errors, and the volume is attractively but conservatively bound. Both Dr. Russell and the publisher are to be congratulated for the production of this book, which should be in the library of all persons interested in malaria as a public health and social problem.

ERNEST CARROLL FAUST

THE BULLETIN RECENTLY RECEIVED *

Horacio Abascal. *Reseña Histórica y Sinonimia de la Frambuesa y de la Pelagra.* Cuadernos de Historia Sanitaria, 9. La Habana: Ministerio de Salubridad y Asistencia Social, 1955. 35 pp. Ill.

Erwin H. Ackerknecht and Henry V. Vallois. *Franz Joseph Gall, Inventor of Phrenology and His Collection.* Translated from the French by Claire St. Léon. Wisconsin Studies in Medical History, No. 1. Madison, Wisconsin: Department of History of Medicine, University of Wisconsin Medical School, 1956. 86 pp. Ill. $1.50.

The Great Physiodynamic Therapies in Psychiatry: An Historical Appraisal. Edited by Arthur M. Sackler and others. New York: Paul B. Hoeber, Inc., Harper & Brothers, 1956. xiv + 190 pp. Ill. $5.75.

Norman L. Hoerr and Arthur Osol (editors). *Blakiston's New Gould Medical Dictionary.* Second edition. New York, Toronto, London: Blakiston Division, McGraw-Hill Book Company, Inc., 1956. xxvi +1463 pp. $11.50.

Henry E. Sigerist. *Landmarks in the History of Hygiene.* University of London, Heath Clark Lectures, 1952. London, New York, Toronto: Geoffrey Cumberlege, Oxford University Press, 1956. xiv + 78 pp. Ill. $3.00.

Clarence McKittrick Smith. *The Medical Department: Hospitalization and Evacuation, Zone of Interior.* United States Army in World War II. The Technical Services. Washington, D. C.: Office of the Chief of Military History, Department of the Army, 1956. xxiii + 503 pp. Ill. $4.00.

* The *Bulletin* reserves freedom of decision as to the publication to be listed in this section.

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